

THE IRON AGE

Established 1855

NEW YORK, March 12, 1914

Vol. 93: No. 11

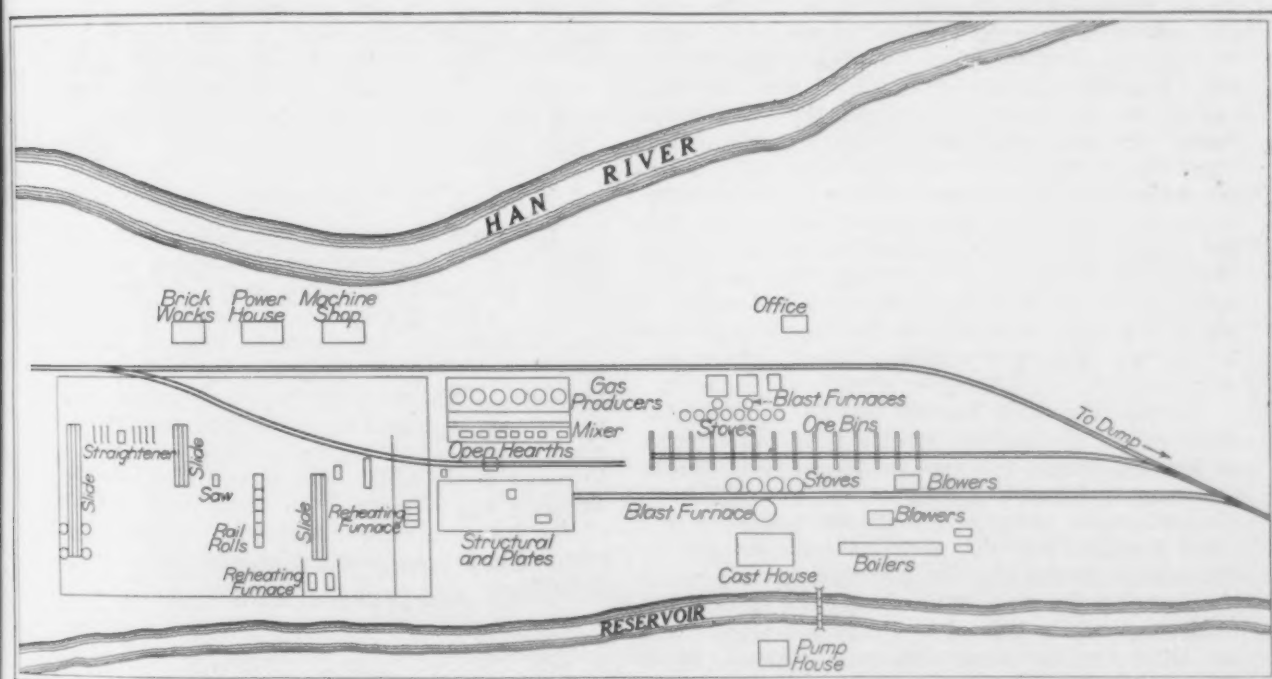
The Iron and Steel Works at Hanyang, China*

The Raw Materials Used, Their Sources and Analyses—The Different Grades of Pig Iron and the Variety of Finished Steel Products

BY EDWIN A. SPERRY†

While the metallurgical conditions in China are ordinarily most primitive, the steel works at Hanyang, operated by the Han-Yeh-Ping Iron & Coal Company can very rightly lay claim to being modern and up to date. At the confluence of the Han and the Yangtse rivers are three cities of considerable size. Wuchang on the south and directly

west on the Yangtse, from the south on the Hsiang, and from the coast on the east, on the Yangtse, as well as being directly connected with Peking by the Peking-Hankow Railroad, the location of the works at Hanyang can only be considered as most logical and fortunate. In the fuller development of the industries of China there can be but one conclusion



Plan of the Blast Furnaces, Open-Hearth Steel Plant and Rail Mill at Hanyang, China

opposite to the mouth of the Han, with Hankow and Hanyang on the north between which flows the Han river. From the mouth of the Han to Shanghai on the coast, the Yangtse has a length of something over 500 miles, the entire distance being navigable by large ocean going steamers.

Being so centrally located, having navigable waterways from the north on the Han, from the

and that is that this special locality is bound to become one of the greatest commercial centers of the nation, if not the greatest, and perhaps one of the world's most important centers.

CANTON AN EARLY LOCATION

The history of the enterprise has in it many interesting and instructive details—interesting in methods and means of its conception and development, and instructive in showing what great possibilities are probably lying dormant in China, waiting only for adequate legislation regarding the mining industry, as well as for capital and energy to open them up and place them on the schedule of the world's wealth producers. This history also

*In *The Iron Age* of May 7, 1908, p. 1435, was an article on "The Iron Industry of China," largely devoted to the blast furnaces and steel works at Hanyang, and in *The Iron Age* of February 4, 1909, an article by Theodore D. Morgan on "Steel Making in China" dealt with practice at the Hanyang works. Professor Sperry tells of later developments, writing with an intimate knowledge of the metallurgical conditions.

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shows how bountifully nature had provided against disastrous failure, even though the enterprise had been inaugurated in the most complete unpreparedness.

At the time of the projection of the Peking-Hankow Railroad, some 30 years ago, Chang Chih-tung, then viceroy of Liang Kuang (the two Kuangs, Kuang Shi and Kuang Tung) in which is located Canton, conceived the idea of establishing steel works at Canton for the purpose of supplying rails and other steel material for its construction. Without any preparation he ordered machinery and equipment for the purpose, from England. On incompetent advice he planned to use the acid Bessemer process. After securing the machinery it was found that, as no arrangements had been made as to ore supplies, it was necessary to defer the construction of the plant for a time at least. Before this question was settled Chang Chih-tung was transferred to the position of viceroy of Hu Kiang which embraces the present Provinces of Hupei and Hunan. He followed up his plan, however, from this point and very soon the existence of the great ore bodies at Tayeh was called to his attention by Sheng Shun-huai, another man of great enterprise and foresight. It was then decided to erect the works at Hanyang as the most central and proper place. In this way, practically by chance, was this natural center selected.

EARLY TROUBLES WITH STEEL

After the works had been constructed it was found necessary to import the coke for the blast furnace from Europe, which of course added much to the expense of operation. Owing to this and the fact that the quality of the steel was not high enough for the purposes intended, the company became very seriously involved financially. At this time Sheng Shun-huai was appointed chief director with the authority to purchase such coal properties as would afford an adequate coke supply. After looking about, he purchased the mines at Ping Hsiang in the province of Kiang Shi, about 250 miles to the south of Hanyang, with a distance of about 300 miles of transportation which is covered by the use of barges and tugs through the waterways leading to the Yangtse river.

To cure the other trouble, that of the quality of the steel, Li Wei-ko, who at that time was director of the steel works, was sent to Europe to determine the cause and find a proper method of avoiding it. He took many samples of both ore and steel and after consultation with prominent authorities on the subject, found that the principal trouble lay in the fact that the ore contained too much phosphorus to be successfully treated by the acid Bessemer and too little for the basic Bessemer method, as it ranged from 0.04 to 0.2 per cent., with an average of about 0.05 per cent. After carefully advising in the matter Mr. Li ordered equipment and material for open-hearth furnaces in which might be used the basic process. These were installed at the works, the converters abandoned and a good grade of steel has been produced as a result.

IRON ORE HANDLING

We shall not go into the details of the ore production, as that has been covered by other writers, and it will only be necessary to state that the Tayeh mines, situated about 90 miles down the Yangtse from Hanyang, supply the entire amount, or approximately 1500 tons daily. This is transported in barges which vary in capacity from 350 to 650 tons each. They are towed by large tugboats and are wharfed at the grounds of

the works. The ore is then transferred to small dump cars by coolie labor which is paid at the rate of 30 tungtse, or about 12.5c. gold, per day per man. In this work it is estimated that each man will handle one ton per day, so it may be seen that this item of expense is quite low.

The dump cars are hauled by the yard engine to the storage bins which are conveniently located near the center of the yard and accessible for the charging of all three blast furnaces. These bins are on the general yard level and in one row, the dividing walls being in the form of thin masonry piers about 20 ft. in height, over which the dumping track is located. The cars are run along this track to the proper bin and dumped. The storage capacity of the bins is about 40,000 tons and is distributed as follows:

Ore	20,000 tons
Fluxes	4,000 tons
Coke	13,000 tons
Manganese ore	3,000 tons

The iron ore is of excellent grade so far as the iron content is concerned and according to the results of eight analyses, furnished by the company in 1911 at the time of the writer's visit to the works and the mines, has a range of composition as follows:

	Per Cent.
Fe	63.55 to 65.10
SiO ₂	4.24 to 5.34
S	0.12 to 0.70
P	0.04 to 0.058
Al ₂ O ₃	1.00 to 2.00
Mn	0.20 to 0.40
Cu	0.17

Of these samples the following is the average composition:

	Per Cent.
Fe	64.39
SiO ₂	5.27
S	0.36
P	0.048
Al ₂ O ₃	1.50

LIMESTONE

The limestone used as flux is obtained from the same locality in which the iron mines are located, and in fact one of the walls of the ore body is composed of a very good grade of limestone. This body has, however, a considerable amount of pyrite, which, on account of the sulphur, is unfit for fluxing purposes. The lime deposits are very extensive and as distance is gained from the iron deposits the pyrite disappears and reaches a grade sufficiently high to make it available. The methods of mining and shipping are identical with those used in the case of the iron ore so will require no further description. The average composition of the limestone is as follows:

	Per Cent.
CaCO ₃	80
MgCO ₃	6
SiO ₂	10
Fe	4

COKE

As stated before, the coke used at the works is supplied from the Ping Hsiang mines which are located in the province of Kiang Shi. At the mine the company maintains a well equipped washery and several batteries of ovens of the Otto-Koep type. The coal as mined has an average analysis as follows:

	Per Cent.
Fixed carbon	55
Volatile	20
Ash	25

The ash from this is as below:

	Per Cent.
Silica	65
Alumina	26
FeO	5
Lime	10
Magnesia	10

The average analysis of washed coal is:

	Per Cent.
Fixed	62
Volatile	26
Ash	12

The ash from this has an average of:

	Per Cent.
Silica	60
Alumina	27
FeO	4
Lime	5
Magnesia	4

The following is an average analysis of the coke:

	Per Cent.
Fixed	88
Ash	12

The coke ash has an analysis of:

	Per Cent.
Silica	60
Alumina	31
FeO	5
Lime	2
Magnesia	2

BLAST FURNACE PRACTICE

There are three blast furnaces, two of which were built originally, while the third has been added more recently. The former are 79 ft. in height, and with a bosh diameter of 12.5 ft. The crucibles are 7 ft. in diameter and 8 ft. deep. These furnaces have a capacity of from 125 to 140 tons of pig iron per day each. The third furnace is of considerably greater capacity, being 100 ft. in height with a bosh diameter of 21.75 ft. The capacity of this furnace is about 300 tons of pig iron per day.

In charging the furnaces, the charging cars are loaded with the proper proportions of ore and limestone or with coke and are raised to the charging platform by a vertical lift operated either by steam or electricity as may be desired. The charge is based on 3300 kilos of dry coke and is as follows:

Coke	3300 kilos
Ore	4700 kilos
Limestone	1450 kilos
Manganese ore	250 kilos

Basing on 94 charges per day in the large furnace with a production of 300 tons of pig, we find an efficiency of 87.5 per cent. of iron to the coke used and a production of 62 per cent. in pig iron to the amount of ore charged. From an analysis of the slags it appears that these calculations may be slightly in error at the expense of full efficiency, as there is an average of 0.65 per cent. of iron. In no case in the ten samples averaged did it reach 1 per cent., the highest being 0.82 per cent.

PIG IRON ANALYSES

Pig iron of various grades and quality is produced ranging from foundry iron through the grades used in the production of steel. The following list will indicate the compositions:

Foundry Iron					
No.	Si	Mn	P	S	C
I	2.5-3	0.5-1.0	0.1-0.0	0.02-0.04	3.2-3.5
II	2-2.5	0.5-1.0	0.1-0.0	0.02-0.04	3-3.2
III	1.5-2	0.5-0.9	0.1-0.2	0.04-0.05	3-3.2
IV	1-1.5	0.5	0.1-0.2	0.05-0.08	2.5-3.0
Bessemer Iron					
	2-2.5	1.5-2.5	0.08-0.10	0.02-0.04	3-3.5
Puddling Iron					
	0.1-1.0	0.5-2.0	0.1-0.2	0.05-0.10	2.5-3.0
Siemens-Martin Iron					
	0.8-2.5	2.0-3.0	0.1-0.2	0.01-0.05	3.5-4.5

An average of ten analyses of slags which were being produced at the time of my visit to the works was as follows:

	Per Cent.
SiO ₂	34.48
Al ₂ O ₃	14.06
CaO	47.50
MgO	2.31
Fe	0.65
Mn	1.07

STEEL WORKS PRACTICE

The refining department is equipped with a mixing furnace which is of the Wellman tilting type and has a capacity of 50 tons. This is supplied direct from the blast furnaces through the medium of a ladle. The charge is kept thoroughly mixed by occasionally tapping into a ladle and returning through the charging door. The heat is kept up only sufficiently to hold the iron in a properly molten state. The mixer is located at the end of the charging platform for the open-hearth furnaces, nearest to the blast furnaces, making it convenient both for charging and discharging.

There are at present six open-hearth furnaces of the Siemens-Martin type in which the basic method is used. Four of these are regularly in operation while two are usually down for repairs. Of course the usual daily or weekly repairs are made without much delay to the regular operation. These furnaces have a capacity of 30 tons at each pour and are tapped every eight hours or three times daily. The method of charging is the "scrap and pig" method, the scrap being charged first and the molten pig added. The proportions of each were not ascertained but from observation would be placed at one-third scrap to two-thirds pig.

The recarburizing is done in the furnace just before tapping, as the blast furnace slag is so small in quantity, having been quite thoroughly eliminated in passing through the mixer, and also as the amount of phosphorus is very small the danger of rephosphorization is not very great.

The usual method of casting ingots is used and the stripping is done with an hydraulic stripper. From this the ingot follows the ordinary course through the reheating furnaces and then to the blooming rolls. These rolls are operated by electricity and are reversing. At the time of my visit to the works they were producing 100-lb. railroad rails and were using a 4600-lb. ingot from which four rails were made.

The rolling mill is equipped to produce a large variety of shapes and sizes of steel among which, besides the ingots, from 2200 to 5900 lb. are blooms and billets of different sizes, slabs, sheet bars, round and square bars, flat bars, sheets, plates and a number of structural shapes, such as angle bars, tees, I-beams, channels and rails.

EQUIPMENT

The blast is supplied by two Parsons turbo-blowers, the one supplying the small furnaces having a speed of 2400 r.p.m., with a capacity of 800 cu. m. of free air at a pressure of from 8 to 10 lb., and the other a speed of 2800 r.p.m., supplying the large furnace at a pressure of 11 lb.

There are two power plants, one at the south end and the other at the north end of the plant. That at the north end uses the waste gas from the blast furnaces in the generation of steam and supplies power for the blowing engines, while that on the south is coal-fired and supplies power for the rolls, cranes and charging machines.

At the back of the charging platform is a battery of gas producers of the Morgan type. These supply gas for the open-hearth furnaces. The coal used is imported from Japan as that from the Ping Hsiang mines, the property of the company, is not suitable, containing about 0.1 per cent. of sulphur.

The plant is supplied with a good foundry and machine shop in which all the rolls are prepared and such castings as required are made and finished. There is also a well-equipped brick plant for the manufacture of the different classes of refractories which are used in the operation of the plant.

Internal Transverse Defects in Steel Rails*

Austrian and American Fissures Compared—Cracks Not Due to Traffic Conditions, But to Poor Steel

BY ROBERT JOB

Internal transverse cracks or fissures in rails cannot be detected in track until the rails in which they occur have become seriously weakened, and a failure may thus occur which cannot be guarded against by even the most rigid system of track inspection. It has been clearly demonstrated that the cracks, or at least the majority of them, are not in the rails when rolled, since frequently they are found with clean, bright, unoxidized surfaces, entirely surrounded by unbroken metal. After the crack has grown large enough to extend to the surface, generally at the side of the rail, moisture is admitted and the surfaces of the crack then become discolored or oxidized.

In some of the discussion which has taken place during the past few years it has been assumed that

INVESTIGATIONS IN AUSTRIA

What is now termed an "internal transverse crack" or "fissure" in rails, was carefully investigated in Austria before the beginning of the present century and some of the results of the study were published by Anton Ritter von Dormus at Vienna in 1901. In order that Professor Dormus's studies may be better known in America, we take the liberty of reproducing several of his illustrations, Figs. 1, 2, 3 and 4. Figs. 1 and 2 are typical examples of the defects as we find them in this country, and it is interesting to know that in Austria these failures occurred in Thomas (basic Bessemer) steel, in which the carbon content never exceeded 0.40 per cent., and in most instances was much less. The weight of the rails was about 70 lb.



Fig. 1—Austrian Rail with Internal Transverse Fissure



Fig. 2—Austrian Rail with Internal Transverse Fissure



Fig. 3—Austrian Rail, Etched, Showing Unsoundness



Fig. 4—Austrian Rail, Etched, Showing Dirty Steel



Fig. 5—Open-Hearth American Rail with Internal Transverse and Longitudinal Cracks after Two Months' Service



Fig. 6—A Polished Section of Same Rail as Fig. 5 Showing Longitudinal Cracks

the internal transverse crack or fissure is a recent development in railroad practice caused by extreme modern conditions of traffic, or by extreme variation in composition, as for instance, by extreme wheel pressures, or by high carbon content, or by a combination of both, and that the conditions of manufacture of the steel have little or no influence in the final formation of these defects. These statements do not accord with the results of carefully conducted investigations by the writer, and they are also at variance with the results of studies made in other countries.

*From an article entitled "Internal Transverse Cracks and Fissures in Rails," in the Railway Age Gazette, February 6, 1914.

per yard and the defects developed sometimes after a very short service, though at other times only after a service of 20 years or more.

Thorough study was made to determine the cause of the defects, and Professor Dormus found that they were present in rails in which the steel was unsound, as shown in his etchings (Figs. 3 and 4) and he reached the conclusion that the defects developed in service when iron oxide, sulphur or other foreign matter was present in excess. He states that they are a result of defective manufacture and that there is no reason to suppose that they originated through too heavy trainloads, as long as the steel was sound. Professor Dormus also decided that in some cases the defects were

formed during the manufacture of the steel while the steel was still hot, since he found that some of the spots which were entirely surrounded by unbroken metal were colored blue or black, or in other words, were oxidized. He states further that in these defective rails the number of these cracks is sometimes very large, as many as 42 having been found in a rail about 20 ft. long. Professor Dormus has never seen these defects in rails made from open hearth steel, but he writes that their occurrence in this country in steel made by that process is simply a proof that the rails in which the cracks developed were not properly manufactured. In view of Professor Dormus's standing in metallurgical circles abroad, the results of his investigations are of decided interest and importance in this country, particularly since the defects abroad occurred in very low carbon steel, and under what, to us, would be considered moderate traffic conditions.

The above conclusions coincide fully with our own investigations, although, as we have stated elsewhere (Proceedings International Association of Testing Materials, 1912) we have found the defects both in Bessemer and in open hearth steel, and in high carbon, as well as in low carbon steel. In every case we also have found porosity, segregation,

which failed in service showing the internal transverse cracks or fissures. The rails thus removed had no apparent defects. They were placed under the drop test head down, and a weight of 2000 lb. was let fall from a height of 18 ft. at frequent intervals along their entire length. Under these conditions the rails tested would have been broken had the slightest crack or fissure been present, but not a single failure occurred in any of the rails thus tested, although they were bent and twisted by the force of the drop test. The composition of these rails was within the same range as that of the rails which contained the internal cracks, some of them being harder and some softer. As a further test, other rails of the same general weight and composition were removed from track at random from locations where the traffic was heavy. These rails were also tested, head down, under the drop, along their length without finding a single indication of the defects.

TRAFFIC CONDITIONS NOT THE CAUSE

The results cited above proved that track or traffic conditions were not the prime cause of the growth of the cracks, particularly since we found that they did not appear upon the lighter sections



Fig. 7—Same Rail as Figs. 5 and 6, Polished and Etched

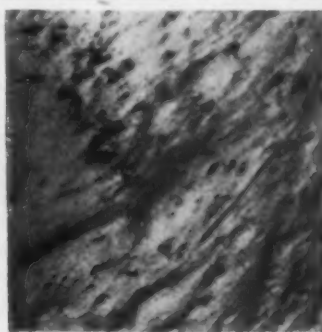


Fig. 8—A Transverse Section of Same Rail as Fig. 7 Magnified



Fig. 9—Longitudinal Section of Same Rail as Fig. 8 Magnified

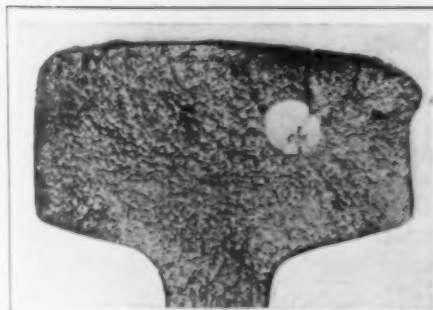


Fig. 10—Bessemer Steel Rail Showing Embryo Internal Transverse Fissure

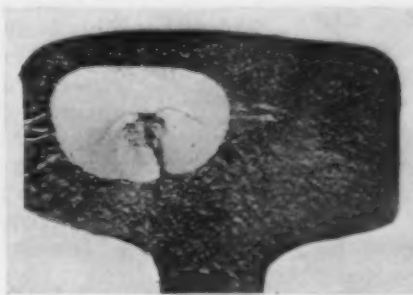


Fig. 11—Open-Hearth Steel Rail Showing Development of Internal Transverse Crack

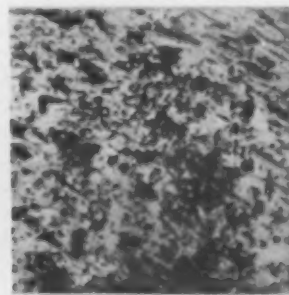


Fig. 12—Open-Hearth American Rail, Magnified, in Which Defects Developed in a Few Months' Service

or other evidence of defective manufacture in the steel. We have also found that where one of the cracks occurred in a rail many others were present. The brief statement given above will serve to show the close agreement of the results of investigation abroad as compared with our own.

Owing to the dangerous character of this internal type of failure, it seemed to us essential to know whether the defects were characteristic of certain rollings at the mills, or whether they were present only in individual rails, or whether they developed in rails generally owing to certain conditions of track or of traffic. In order to gain information regarding these matters, rails were removed from track upon both sides of and adjoining various rails

of rails which had been in service under the same conditions in some cases for years, and the inference was clear that the difference in the service value of the rails was simply a result of difference in the quality of the steel, as was the case in Austria. These conclusions have been fully confirmed by critical comparative study of rails which have contained these defects, and of those which under the same condition of traffic did not contain them. The difference in service simply means that the rails which failed contained defects of manufacture which so weakened their powers of resistance that they were overloaded by ordinary weights and stresses which exerted no injurious effect upon rails in which the steel was sound and properly made.

As an example of the defective quality of steel which results in internal transverse cracks after short service, we give photographs of an open-hearth 100-lb. rail which failed in track after less than two months' service, owing to the above mentioned defects. Fig. 5 shows two internal transverse cracks extending over more than one-half the area of the head of the rail within about one-half inch of one another, joined by a longitudinal crack along the rail about one-half inch from the top of the head. Fig. 6 represents the polished section showing the longitudinal crack and also a diagonal longitudinal split. Fig. 7 shows this same section etched and indicates clearly the defective condition of the steel, while Fig. 8 is a microscopic section of the steel close to one of the defects, upon the gauge side of the head one-half inch from the top. The section was polished but not etched, and this figure represents the transverse surface magnified 50 diameters. Fig. 9 is taken from the same section, but it is a longitudinal view. These sections show very clearly the porous, weak and unserviceable condition of the steel and give clear testimony as to the cause of the brief life in service. The composition of this rail was as shown in the following table:

	Rail, per cent.	Heat analysis per cent.
Carbon	0.78	0.72
Phosphorus	0.050	0.037
Manganese	0.84	0.86
Sulphur	0.032	0.040

This composition does not indicate the cause of failure. The rail was the second in the ingot—a "B" rail, equivalent to a cropping of over 30 per cent. As illustration of the growth of these internal defects we give below Fig. 10 and Fig. 11, the former from Bessemer and the latter from open-hearth steel. It will be understood that in course of time the small crack shown in Fig. 10 would develop to the size shown in Fig. 11 or Fig. 5, if failure did not previously result.

Fig. 12 shows the character of steel found in another open-hearth rail which developed internal transverse cracks in less than six months' service. The composition of this rail was as follows:

	Per cent.
Carbon	0.70
Phosphorus	0.027
Manganese	0.97
Sulphur	0.055

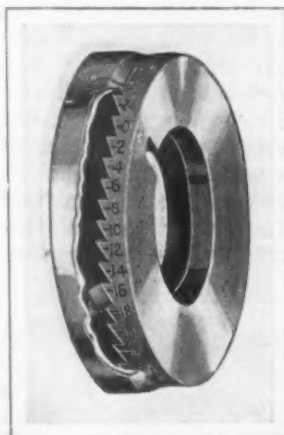
The photomicrograph is magnified 50 diameters and it will be seen that the steel is excessively dirty, fully accounting for the weakness which resulted in the failure.

The illustrations which have been given and the statements made are an emphatic indication of the need of uniform and careful mill practice, not merely under present conditions of American railroad practice, but equally so under Austrian conditions 15 years ago. Absolute perfection in the manufacture of steel rails is not expected, nor is this necessary to ensure safety, but it is of the greatest moment to railroads and to the traveling public that sufficient care shall be exercised by the mills to guard against the defective condition—the unsoundness or the brittleness—which is liable to result in failure in service, and it should also be the constant effort of every mill to make the supervision, inspection, and test of its output sufficiently thorough to detect and to reject the material which is defective and unserviceable. Inspection and supervision of this character and effectiveness should be undertaken by every mill as a necessary safeguard of the good name of its product, apart from considerations of service, and it is equally important that steps should also be taken by it to be on

the watch for and to eradicate the slightest disposition upon the part of any member of its force—such as payment upon a tonnage-accepted basis tends to generate—to secure the acceptance of the greatest possible percentage of output without regard to the quality of the steel, or the likelihood of safe and efficient service.

Spacing Collar for Milling Cutters

Scully-Jones & Co., Railway Exchange Building, Chicago, Ill., have brought out an adjustable spacing collar for use on the arbor of a milling machine. It is designed primarily for operations involving the use of a milling machine where two or more



An Adjustable Spacing Collar for Use on the Arbor of a Milling Machine to Vary the Distance between Cutters where Accurate Adjustments Are Required

cutters located on the same arbor must be spaced at an exact distance. It is pointed out that while gang or straddle cutters are employed for operations of this nature, it is sometimes necessary to grind the sides of the teeth, which, of course, changes the distance between the faces of the cutters and compensation must be made for the amount ground off to maintain the exact sizes on the piece being machined. To provide for this an assorted lot of solid spacing collars of varying lengths is carried in stock, and if

the exact size cannot be found, a solid collar that is too long must be ground off or one that is too short shimmed up, with the result that the milling machine is standing idle in the meantime.

This new collar, to which the name Wear-ever has been given, is designed to give a total variation in the spacing between milling cutters of 0.024 in. This is divided into twelve spaces of 0.002 in. each, a set of graduations on the edge of the collar showing exactly the amount that the collar has been spread. It is emphasized that the adjustment of the collar is made quickly and that the collar is the same as a solid collar after the adjustment has been made, while it is pointed out with the threaded collar there are sometimes inaccuracies due to the wear of the threads.

A patent (1,083,379) for decreasing the segregation in ingots has been granted to Louis W. Southgate, Worcester, Mass. He claims to have discovered that the method of making a cast by keeping the top part molten for a long time, so as to prevent piping, can be carried out by agitating or stirring the molten metal at the top of the mold while the body of metal solidifies. He claims to accomplish this by means of a revolving rake, loosely mounted on a shaft, which operates in the top of each mold. Ingots made by this method are asserted to be practically free from piping.

A patent (1,084,688—January 20, 1914) has been granted to Alan Wood, 3d, Conshohocken, Pa., on a water-cooled gas port, for a regenerative open-hearth furnace, consisting of a double walled metallic tube constituting a water back and lined with refractory material. The tube extends into the furnace through the outer wall and has its front bottom portion and its sides set in the brickwork of the furnace with a covering of refractory material over its top. Means are provided for water circulation in the water back.

Rotary Cutting-Off Machine for Tubes

Schuchardt & Schütte, West Street Building, New York City, have placed on the market a rotary cutting-off machine for bars, tubes, etc., which is built by Charles Taylor, Ltd., Birmingham, England. In this machine, as the name indicates, the cutter revolves around the bar or tube, which is held stationary in a vise, and the stock can be moved up and regripped for another cut without stopping the cutters. Another special feature about the machine is that it is not necessary for the cutters to be set exactly alike to have them perform the same amount of work, as a special automatic balancing device is provided.

The headstock of the machine is an iron casting forming the main body of the machine and having split bearings. In these a hollow cast-iron spindle carrying the cutter head, which is firmly attached to the spindle, runs. There are two cutter slides in the head operated by a hand lever, which feeds them in by tension chains and has an automatic balancing device to insure the two cutters doing the same amount of work. The end play is taken on ball bearings. The tension chains are protected by a steel liner running the whole length of the spindle, which is driven by a cast-iron pulley 16 in. and wide enough to take a 3-in. belt.

The cutters are of plain oblong section and are rigidly supported throughout their length. It is pointed out that the location is such as to give ample clearance at all times, and it is only necessary to grind them on one face. The tension strips which feed the cutters in are attached to a yoke which oscillates on a cylindrical seat and as one cutter is forced out the yoke will move a corresponding amount on its seat and draw the opposite cutter in until both are doing the same amount of work. It is, thus, unnecessary to have the cutters set precisely alike to gauge by a skilled operator. The

lower lever stop of the machine, which has a spring plunger, is set to act so that the spring is compressed as the stock is finally parted, and in this way the advance of the cutters is retarded at the last minute, and the end of the stock is left clean.

The headstock is mounted on a cast-iron pan having a drain and reservoir for collecting the cutting compound which is forced upon the cutters by a pump attached to the rear of the headstock and driven by a round belt $\frac{3}{8}$ in. in diameter from the machine spindle. The stock is held in front of the cutters in a self-centering vise, which has hardened steel jaws. The capacity of the vise is such that it will take a large variety of sections without any extensive alterations or adjustments being necessary to adapt it to the different sizes. For supporting the portion of the stock projecting from the vise an adjustable roller support is provided which is relied upon to facilitate feeding the material through the vise, while the cut-off pieces are supported in the spindle on a long extension projecting into the spindle from the rear end. The stock stop is fixed at the rear end of the spindle and is operated by a small foot lever as the stock is fed forward.

In tests of the machine a bar of round, mild steel, $\frac{3}{4}$ in. in diameter, has been cut off at an average time of 11 sec. per piece and 110 pieces have been cut from a bar 3 in. in diameter in 2 hr. The machine can also be used for gas pipe and material $\frac{1}{2}$ in. in diameter has been cut in an average time of 5 sec. and pieces have been cut from 2-in. pipe in an average of 18 sec.

The Strength of Wire Rope

An investigation of the strength and durability of wire rope has been made by Prof. G. Benoit at the technical high school at Karlsruhe, and as far as completed, as reported in Glückauf, is substantially as follows:

The experiments were made with a patented cast steel wire, 1 mm. in diameter, which showed a strength of 247,000 to 255,000 lb. per sq. in., with 227,000 lb. per sq. in. guaranteed. The wire was tested singly and also twisted to a strand of seven wires, 3.1 mm. in diameter, there being six steel wires and a core of a softer wire of a strength of about 122,000 lb. per sq. in. This rope withstood a pull of 1770 lb. The soft core did not break but stretched considerably.

Three of the strands were then combined to a rope of 6.8 mm. in diameter and five to a rope of 8.5 mm. in diameter, the latter with a hemp core. The wires and ropes were bent over a pulley through an angle of about 90 deg. at the rate of 1000 turns per hour, the turn meaning the bending of the wire from the straight and then back to the straight again. The stress to which the wire under test was generally subjected was 11,200 lb. per sq. in. The single wires stood 198,710 bends; the twisted strand had one or two wires broken after 44,800 and 47,190 bends.

The first experiment was carried on with a pulley $6\frac{7}{8}$ in. in diameter, and a larger pulley was then substituted, $7\frac{1}{8}$ in. in diameter. On this the single wire stood 122,000 to 200,000 bends; the twisted strand showed breaks in three wires after 40,860 bends. The cable of three ropes had one wire broken after 22,860 bends and is said to have been practically done for after 36,440 bends. The five-rope wire began to fail after 35,000 bends and was given up after 40,000 bends. The conclusions so far seem to indicate that twisting leaves considerable strains in the wire rope and especially in those of high-class steel.



A 3-In. Rotary Cutting-Off Machine for Bars and Tubes Equipped with a Special Balancing Device to Equalize the Work of the Cutters

USING GAS TORCH ON A WRECK

Reclaiming the Twisted and Crumpled Remains of a Steamship Explosion

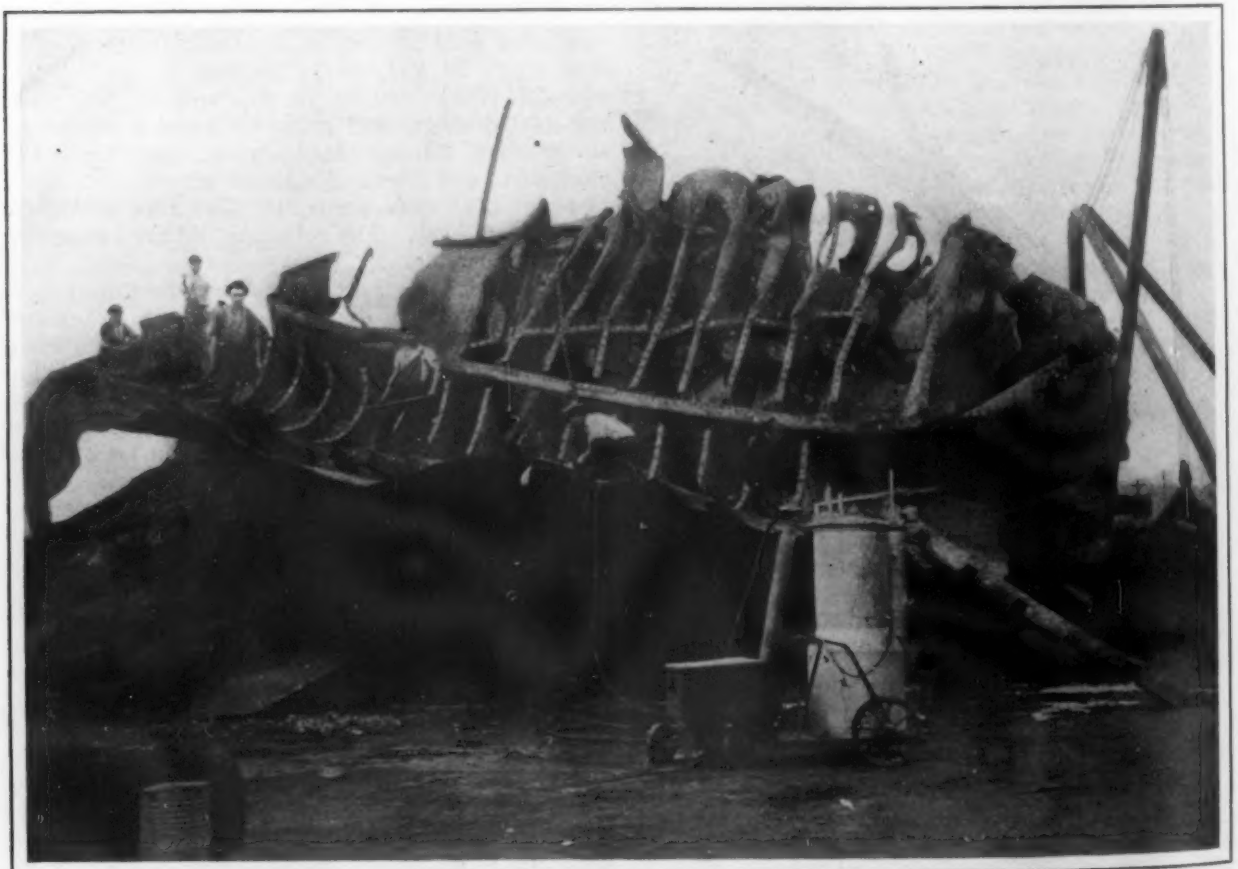
The oxy-acetylene cutting torch was used successfully for the reduction to steel mill scrap of the tangled wreckage of the 1800-ton steel freight steamship *Alum Chine*, which was destroyed by the explosion of 300 tons of dynamite in its hold while loading a cargo in the lower harbor of Baltimore for Panama on March 7, 1913. The entire forward part of the ship was blown away by the violence of the explosion and the deck and upper works were reduced to fragments, pieces of steel from 3 to 5 ft. long being found from 2 to 3 miles from the wreck. The major portion of the hull was sent to the bottom of the harbor under 33 ft. of water. A survey of the site showed that the after part of the hull, containing several hundred tons of steel, was resting on the harbor bottom just outside of the channel covered by about 13 ft. of water. The boilers and engines and all the upper portion of the vessel were gone and the steel beams and plates of the hull were badly bent and greatly twisted.

To protect navigation it was necessary to remove the wreck and a contract was awarded to the Merritt-Chapman Derrick & Wrecking Company during the past summer. To cut the hulk into pieces of a size small enough to be handled by the 80-ton steel floating derrick assigned to the work divers were sent down to lay strings of dynamite that were afterward exploded under the water. The sections were then lifted on a scow and towed to the dock and yard of the Southern Iron & Metal Company, which purchased the steel from the wrecking contractors for disposal as steel furnace scrap. At the dock the derrick unloaded the scow

and put the pieces of the hull which weighed from 25 to 40 tons in a large pile. Each large piece was a shapeless mass, with the plates and beams bent and crumpled. It was hardly possible to remove the rivets advantageously, as in many cases the flanges of the angles or pieces of plate were bent over flat against them, thus preventing access to their heads. Most of the skin plate of the ship was of $\frac{5}{8}$ -in. steel, and even thicker in some portions along the bottom, while the ribs and longitudinal frames were deep built-up sections composed of plates and angles.

For cutting up the steel an oxy-acetylene plant mounted on a truck was supplied by the Alexander Milburn Company, Baltimore, Md. The mounting of the plant on the truck enabled it to be moved from point to point and long lines of hose were provided for the one torch operator employed to give him sufficient freedom of movement about the wreckage to attack it from the most convenient point. On account of the conditions of the steel work and its general inaccessibility, no definite routine of dismantling the wreckage was followed, the work being started from the top or one side of the pile and carried as far as convenient from that point and resumed from another later on. When pieces of steel, small enough to be handled, were cut out by the torch, they were loaded on wagons and taken to the freight cars for transportation to the steel plant.

Owing to the irregularity of the work, very little data could be obtained as to the rate of progress and other details and this was also complicated by the fact that the work was carried on only periodically, the operator being otherwise employed during a considerable portion of his time. It is stated that the cost of doing the work with the oxy-acetylene torch was about half the expense of ordinary hand cutting.



Reducing the Tangled Wreckage of An 1800-Ton Steel Freight Steamer Destroyed by a Dynamite Explosion to Steel Mill Scrap by an Oxy-Acetylene Torch. In the Engraving the Operator Is Shown Beginning to Cut the Bottom Plates

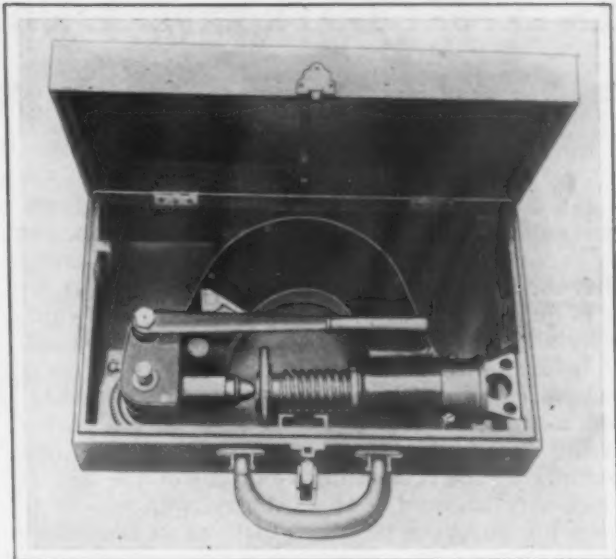
A Portable Hardness Testing Machine

H. A. Elliott, 507 Majestic Building, Detroit, Mich., is placing on the market the Derihon machine for testing the hardness of metals according to the Brinell method. This machine makes an impression with a ball 10 mm. in diameter under a pressure of 3000 kg. For convenience in carrying, the machine can be packed in a small case, as illustrated.

In one of the accompanying engravings the machine is shown ready to test the hardness of a piece of metal with the lever raised and resting on the shaft. The piece to be tested is placed on the table of the machine, which is then raised until it comes in contact with the ball. The lever is then pulled slowly over, giving a progressive pressure, the amount of which is registered by a small gauge until the limit of 3000 kg. is reached. The lever is then slowly returned to its former position and the test is completed. Under normal conditions it is generally sufficient to move the lever through an angle of 45 deg. to obtain the required maximum pressure.

The force produced in the pressure of the ball on the test piece has a tendency to open the frame to a certain degree in proportion to this force and for that reason the shape of the frame has been given special consideration and the steel of which it is made has an elastic limit of 242,000 lb. per sq. in. As the deflection of the frame is between 1 and 1.5 mm., a register, the construction of which resembles a metal manometer, is installed in the hollowed out portion of the frame as shown. A needle and a graduated dial are employed for reading the deflection and consequently the pressure exerted in making the test.

The machine is adjusted by opening the case inclosing the mechanism above the frame. If the machine should get out of adjustment a comparison should be made by making an impression on the standard piece of air-hardened, chrome-nickel steel furnished with the machine. When an impression



The Machine Packed in Its Carrying Case

of the same diameter as that made on the standard piece by the maker is obtained, the needle is made to coincide with the figure 3000 by manipulating a small adjusting screw. It is pointed out however that this adjustment is only necessary as the result of some accident independent of the operation of the machine under normal usage.

Canadian 1913 Mineral Production

A preliminary report on mineral production in Canada in 1913, prepared by John McLeish, chief of the division of mineral resources and statistics, Department of Mines, Ottawa, shows a total value of production in the year of \$144,031,047. Although estimates have been made in some cases, it is probable that the final record will be a revision upward. The total value of the production in 1912 was \$135,048,296, compared with which the 1913 output shows an increase of \$8,982,751, or 6.65 per cent. The average production per capita in 1913 was \$18.57, as against \$18.27 in 1912 and \$14.93 in 1910. Not only has the total output increased from a little over \$10,000,000 in 1886 to its present output but the average production per capita has increased from \$2.23 per capita to \$18.57, or eight times the rate shown by the first record.

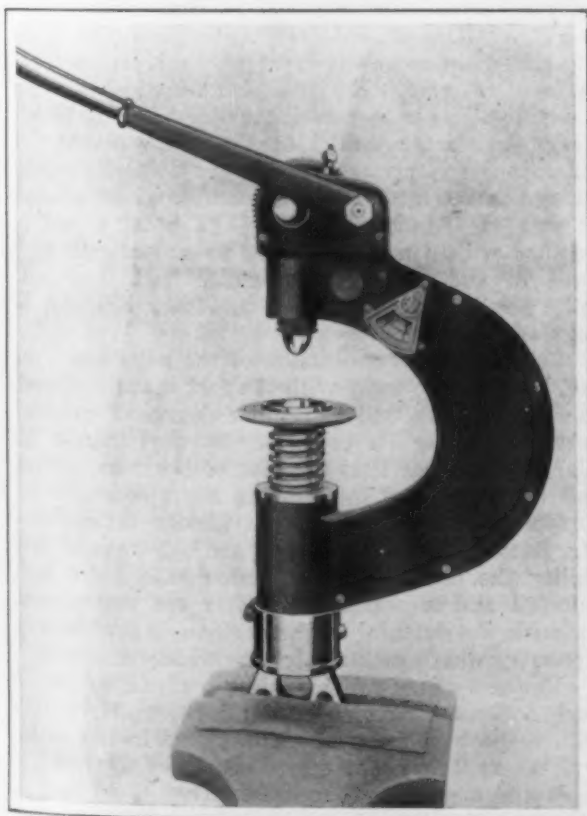
The production of the more important metals and minerals is shown in the following tabulated statement, in which the figures are given for the two years 1912 and 1913 in comparative form.

	1912		1913	
	Quantity	Value	Quantity	Value
Copper ..Lb.	77,832,127	\$12,718,548	76,975,832	\$11,753,440
Gold ....Oz.	611,885	12,648,794	784,525	16,216,131
Pig iron...				
Net tons	42,355	450,886	73,508	996,429
Lead ....Lb.	35,763,476	1,597,554	37,662,703	1,754,705
Nickel ....Lb.	44,841	13,452,463	49,676,772	14,903,032
Silver ....Oz.	31,955,560	19,440,165	31,750,618	18,984,012
Asbestos and asbestic.				
Tons	136,301	3,137,279	161,086	3,849,925
Coal ....Tons	14,512,829	36,019,044	15,115,089	36,250,311
Natural gas ...M ft.	15,286,803	2,362,700	20,345,763	3,338,314
Petroleum				
Brls.	243,336	345,050	228,080	406,439
Cement...Brls.	7,132,732	9,106,556	8,658,922	11,227,284

*From Canadian ore.

The Dominion of Canada does not include Newfoundland. The production of pig iron in Canada is largely from ore imported from Newfoundland and the United States, and such pig iron is excluded from these statistics.

The next meeting of the Chicago Foundrymen's Club, arranged for Saturday evening, March 14, at the Hotel Sherman, will be held in executive session. Matters pertaining to the meetings of the club for the coming year and the character of programmes are to be discussed.



A New Portable Machine for Testing the Hardness of Metals

AN EXPORT TRADE EXPERIENCE

The Danger of Hasty Estimates and the Value of High Grade Representation

BY S. R. STONE

In all important lines of American export trade, particularly in machinery, the methods employed by large houses have improved to such an extent that the following instance is far from typical; yet it is illuminating as an example of practices which were all too common a few years ago and are still to be met with occasionally. When they do occur reports concerning them are apt to be much magnified and to be used by competitors abroad to discredit American enterprise. This story was told recently by the representative of one of the largest machinery builders in this country, who was home from his European post on a visit, as an experience which he had with a former concern employing him in the same field.

The junior partner of a Continental firm, to be known here as M. Blanc, having certain concessions in one of his country's colonies, asked this American agent, whom we will designate as Mr. Brown, to call on him and make preliminary estimates for a group of mills, completely equipped, to be erected in that colony. The process involved was a continuous one, very economical in the use of skilled labor, which had been brought to a higher degree of efficiency in the United States and Canada than elsewhere in the world. For this reason the prospective purchasers were desirous of having the entire plant designed and constructed by Americans under one contract. Mr. Brown talked the matter over quite fully with M. Blanc and convinced him that the American company which the former represented could furnish what was required. He then suggested that M. Blanc, who spoke English fluently, visit the United States, talk with the designing engineers of the company and agree fully on the details of the plans which were to be submitted, at the same time securing accurate data on costs, recommendations as to operation, care of the machinery, etc. This M. Blanc, after a conference with the other members of the firm, agreed to do. Accordingly he was provided with letters of introduction; a representative of the sales manager met him in New York personally to escort him to the factory, and while there he was treated with every possible consideration. However, as he did not wish to close the contract immediately, but wanted complete plans worked out and sent to him later to submit to his partners, the American manufacturers took the precaution of securing his signature to a separate order for the plans themselves. These were to be prepared without additional cost if the contract for the plant was obtained, but were to be paid for at a specified price if not accepted and used.

So eager was the management of the American company to make sure of compensation for the plans that it was inclined to minimize the probable cost of the complete undertaking; hence M. Blanc left for home with the understanding that the total expense would come well within his own preliminary estimates. He so reported to his partners, who were much pleased at the satisfactory course the affair was apparently taking.

FIRST ESTIMATE MUCH EXCEEDED

Some weeks later M. Blanc received a well-executed set of plans, complete and practically faultless in every detail; but what was his horror

to find that the price accompanying the specifications was nearly 39 per cent. higher than the figures quoted to him, which he had embodied in his own report. He saw himself humiliated and disgraced before his partners.

Meanwhile Mr. Brown, as the company's nearest European representative intrusted with the negotiation, had been writing and even cabling to know when the plans were to be sent, expecting naturally that they would be forwarded to him for presentation to the customer, together with a full explanation of any points requiring further discussion. Instead of an answer he received a summons from M. Blanc, whom he found purple with anger and demanding to be told what this chicanery meant.

Mr. Brown, of course, didn't know. Before being in a position to talk about the matter at all he had to learn from M. Blanc what had actually happened and to ask the latter's permission to study the plans and specifications, which he should have had an opportunity to familiarize himself with long before they were seen by the customer.

A HIGHLY ECONOMICAL PLANT

Fortunately, M. Blanc had not yet laid the matter before his partners; and it may be regarded as equally fortunate for all concerned that Mr. Brown was a man of tact, with a thorough knowledge of the class of equipment in question. On going through the plans carefully, he found that his company had really designed a remarkably good plant, much better than any one had originally had in mind. Thus he was able to point out to M. Blanc, on the following day, the various features of improvement, with added daily capacity per unit of equipment, greater ease of operation, economy of skilled labor, fuel, water, etc., and to show him that the difference, when capitalized, represented a large annual saving. This put the matter in a different light. M. Blanc was enabled to lay it before his partners in a manner calculated to reflect additional credit upon himself; and he was naturally concerned, for his own reputation, in placing the most favorable interpretation on the whole affair. As a result it went through without any serious obstacle. Except for the elimination of some details not regarded by the partners as entirely essential, by which the price was shaved considerably, the proposition of the American company was agreed to and the full contract signed. It was also understood that the plant would be doubled within a year or two or a duplicate of it built in another location. Since that time both mills have been constructed and they are now in regular operation.

The successful conclusion of the negotiation did not, however, do away with the fact that the American company showed a singular degree of carelessness in making its estimates at the time of M. Blanc's visit; nor that the lack of business acumen and tact displayed in ignoring the position of its European representative was almost fatal. Had Mr. Brown been an engineer and salesman of less ability the contract would undoubtedly have been rejected and a feeling of bitterness engendered, seriously detrimental to the company's prospects in a country where such affairs are widely discussed.

Nor are cases of this kind confined to export trade. Something similar not infrequently occurs with respect to large contracts placed in this country, where the preliminary estimates are hastily made and a company's representative in the field is either negligent or has not been sufficiently consulted.

Pittsburgh Screw & Bolt Company's Works

Equipment of a Plant Which Has an
Annual Capacity of 60,000 Tons of
Bolts, Nuts, Rivets, Upset Rods, Etc.

The Pittsburgh Screw & Bolt Company is now occupying fully its new plant located on Preble avenue, North Side, Pittsburgh. The company was organized in 1898, and first leased a building at Twenty-fifth street and Liberty avenue, Pittsburgh, formerly occupied by the Westinghouse Machine Company. At the start the concern occupied about one-quarter of the building, but as its business expanded, it finally leased the entire building, and also another building located at Twenty-fourth street and Penn avenue. Later it leased a three-story

put up a new building about 185 ft. wide and 750 ft. long. This building is used for manufacturing purposes, and also for shipping, and a standard gauge track connecting with the Pennsylvania Lines West and the Baltimore & Ohio Railroad runs the entire length of the building, the floor level of the shipping department being on a level with the cars, which are switched in on the east side of the shipping floor. This track has accommodations for storing about 20 freight cars. An entire new sewer system was built under the main building, connecting



Cold Punched Nut Department of the Pittsburgh Screw & Bolt Company

brick building, 100 x 150 ft., on Penn avenue, using the first floor for manufacturing purposes; there were store rooms on the second floor, while the third floor was given over to the offices. When the firm was first organized, its total annual capacity in nuts and bolts, rivets and other products was about 5000 tons per year. Its business kept growing, and early in 1912 the company purchased the Preble avenue plant of the Riter-Conley Mfg. Company, that concern having decided to concentrate its entire manufacturing operations at Leetsdale, Pa.

The company secured possession of the new plant in December, 1912, and at once started to make changes in the buildings to have them conform to its requirements. The first work done was the laying of a cement floor in the entire building, 6 to 8 in. deep. This gives a good solid support for the machinery without concrete foundations. The main building is about 350 ft. wide and 850 ft. long, and on the east side of this building was a storage yard, on which the Pittsburgh Screw & Bolt Company has

with the Ohio River; pumping systems were installed for delivering lubricating oils to the various machines, and two water wells were drilled, well water being used exclusively in the entire plant with a storage tank of 250,000 gal. capacity.

Raw materials are received on a track on the west side of the main manufacturing building, connecting with the Pennsylvania Lines West and extending the entire length of the building. Nearly all these materials are delivered in open cars, and are deposited on the receiving floor by means of a 15-ton crane. They are then delivered to a series of stock bins, close to the machines in which they will be used. The stock piles rest on concrete foundations with upright stringers for keeping separate the different kinds of stock. The material used by the company ranges from $\frac{1}{4}$ in. to 6 in. rounds and from $\frac{1}{4}$ in. to 2 in. squares and in lengths of 12 ft. to 60 ft.

From the stock piles the material goes to the shears where it is sheared into proper lengths, de-

pending on the kind of work for which it is to be used. The hot bolt department has machines with a range of $\frac{1}{2}$ in. to 2 in. in diameter, and in lengths of $1\frac{1}{2}$ in. up to practically 50 in. Each machine has its own heating furnace, gas fired, and the operation is continuous, the raw material first going to the heading machine after which it is heated and then to the pointing bench and finally to the threading machines. The threading department contains numerous styles of machines, each having 2 to 6 spindles. Some of these are of the company's own design.

The cold bolt department is also located alongside the raw material storage, adjacent to the bolt department. The material moves to trimmers, through annealing furnaces, and then to the combined pointing and threading department, which serves both the hot and cold bolt operations. This department makes small rivets, also cold bolts, from $\frac{1}{8}$ to $\frac{5}{8}$ in. inclusive by $\frac{1}{4}$ in. to 6 in. in length. The drive for the hot and cold bolt machines is partly from overhead shafting and partly by individual motors. The cold bolt department is served by gas-fired annealing furnaces designed by the company.

The cold pressed nut department is located alongside the cold bolt department, and contains automatic and hand machines. This department also contains special machines for large nuts, the material moving direct to the tapping department, which is opposite and located between this depart-



Portion of Hot Rivet Department

ment and the warehouse. The facing machines for the finished and semi-finished nuts are located between the tapping machines and the warehouse.

The hot pressed nut department is located alongside the cold pressed department and contains various types of machines. The tapping department serves both the cold and hot pressed nut machines.

The rivet department is located at the southern end of the main building. The machines are placed along the line of the material storage. The company makes structural and boiler rivets from $\frac{1}{2}$ to $1\frac{1}{2}$ in. in diameter and in lengths from 1 in. to 18 in. The rivets are taken from the machines and sorted and packed on the floor and moved directly to the warehouse. This floor is equipped with scales for weighing the rivets before packing, and the operation is continuous throughout, without unnecessary handling of material.

The forge department is located in the end of the building, facing the Ohio River, and is equipped with a crane for handling large rods and forgings. The company makes forgings for bridge work, upset rods and large nuts ranging up to 6 in. in diameter. The forge department is equipped with $3\frac{1}{2}$ -in. and $2\frac{1}{2}$ -in. upsetters, large threading machines with a capacity up to 6 in., two steam hammers and two large shears. The blacksmith forge is located in the same department and contains four forges, two of which are charcoal fired and two are gas fired. All work for the company is done in this department.

The machine shop,



Portion of Cold Bolt Heading Department



Raw Material Store in 800-ft. Bay

tool room and tempering operations are located together in a central part of the main building to provide ready access to all departments. The machine shop has an equipment of lathes and planing, shaping and drilling machines and is engaged in making tools for the shops. The tempering furnaces are located in the tool room and were designed by the company. They are gas fired and are used for tempering their own tools, also high carbon screws for commercial use and for heat treating products made by the company from special alloy steels.

The shipping and warehouse floor is on the east side of the main building. The shipping floor has a capacity for storing about 50,000 kegs of rivets and bolts, also space for storage of loose bolts in bins for shipment in small quantities. There is also a room for assembling bolts and nuts for packing in kegs, paper packages or cases, as required by the trade. There is also a finishing department, containing automatic screw machinery, lathes, shaving and slotting machines, and also the equipment necessary for the set and cap screw departments. This part of the plant handles all lines of turned work, special pins and screws.

In remodeling the buildings to suit its requirements, the Pittsburgh Screw & Bolt Company paid special attention to the comforts of its employees and to the sanitary requirements of the plant. Machines that might possibly cause injury to employees are fitted with safety devices. When operat-

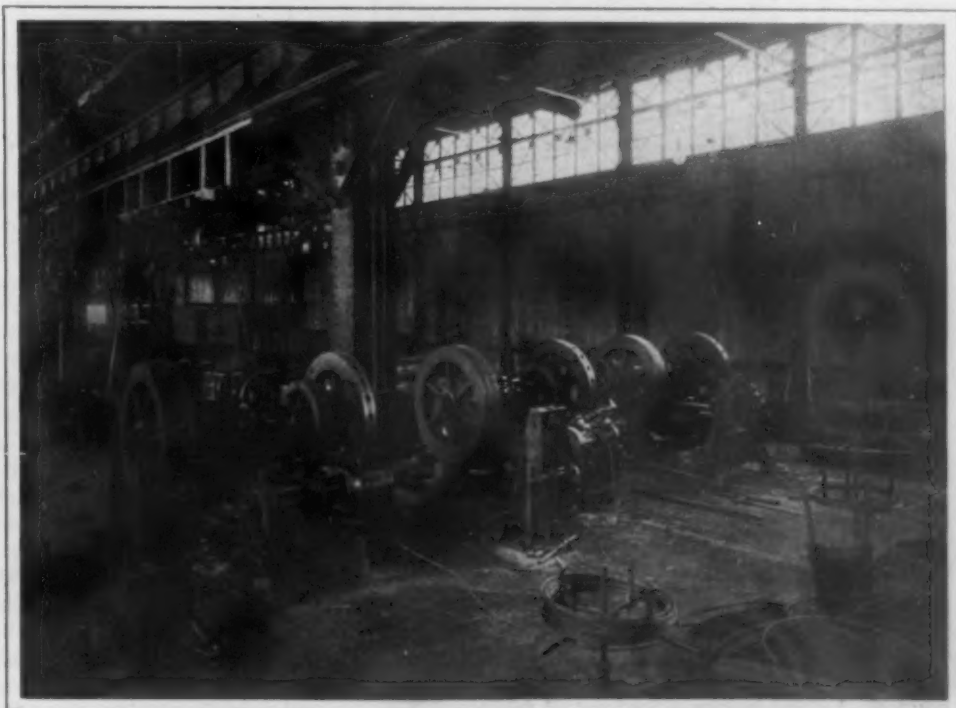
ing full the plant employs about 900 men and to facilitate the men leaving the shops in the evening, four ways are provided, employees Nos. 1 to 250 using one gate; 251 to 500 the second gate; 501 to 750 the third gate and 751 to 1,000 the fourth gate. This same system is also used by the employees when reporting for work in the morning.

The shipping facilities of the plant are excellent, it being served by the Pennsylvania Lines West and the Baltimore & Ohio Railroad. The company also has a number of motor trucks for service in

city delivery and can fill orders from stock within one hour after receipt.

The products of the company consist of machine bolts, cold pressed nuts, hot pressed nuts, semi-finished nuts, finished and case hardened nuts, hot and cold rivets and upset rods. The capacity when running full is about 60,000 tons per year. The company also operates the Gary Screw & Bolt Company, at Gary, Ind., having a capacity of 25,000 to 30,000 tons of finished products per year. The officers are as follows: J. R. McGinley, chairman; Wm. G. Costin, president; W. F. McKenzie, vice-president; C. R. Ferguson, assistant to president; Fred Praegner, treasurer.

The surplus of the Allis-Chalmers Mfg. Company December 31 was \$755,124, representing its profits from the beginning of business on April 16 last. Unfilled orders at the end of the year were valued at \$3,350,000.

Group of Single Blow $\frac{3}{4}$ x 4-In. Cold Rivet Machines

The Acid Electric Furnace Process

German Experiments Show It to Be More Economical than the Basic—The Metallurgical Reactions and the Advantages

Experiments with an acid hearth in electric furnace work have been vigorously carried on during recent years in Europe. This is particularly true of the plant of the Lindenberg Steel Company at Remscheid, concerning which an article was published in *The Iron Age* of June 5, 1913. In further reference to this subject an article has just appeared in *Stahl und Eisen* by Dr. A. Müller, giving the results obtained with an acid lined 3-ton Girod furnace at Gutehoffnungshütte. The hearth was rammed in place and consisted of 80 per cent. old silica bricks, 6 per cent. fire clay, and 14 per cent. tar. It reached to the upper edge of the six steel hearth pole pieces. Table 1 gives analyses of the hearth and silica brick walls before and after the 27 test heats.

The great change that takes place is clearly evident. The carbon of the hearth is reduced, which occurs during the first few heats, and leads to an excessive and undesired carburizing of the bath. With an acid hearth it also brings about considerable reduction of silica, so that the first heat is too high in silicon to be suitable for all purposes. The first heat therefore should be used more or less for a thorough heating of the hearth, and the steel used for rolling or forging if thought desirable.

Tables 2 and 3 show the metallurgical course of five heats, giving analyses of metal and slag, and these results are shown in diagram form in Figs. 1 to 5. The reduction of silica is the most important of all the reactions in the acid furnace, and from the results given four phases of this reduction can be separated:

1. Constant and almost exclusive reduction from

contents of the slag. This can be seen in heats E 29 and E 39 where the silicon in the bath rises rapidly following an addition of sand to the slag. The slags are notwithstanding increased in silica to 55.80 per cent. and 66.27 per cent. respectively; they became difficultly fusible and required more heat.

3. Reduction of silica by increasing the temperature of the slag. An increase in the slag temperature is readily brought about in the electric furnace, and renewed silica reduction sets in. This is seen with heat E 24, where the silica in the slag dropped at one time from 58.80 per cent. to 54.40 per cent., while the silicon in the bath increased about 0.1 per cent.

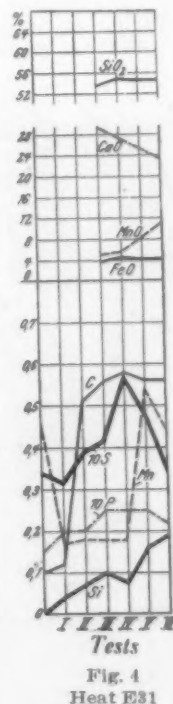
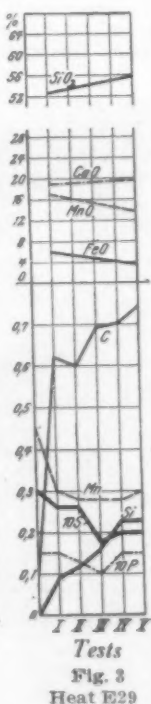
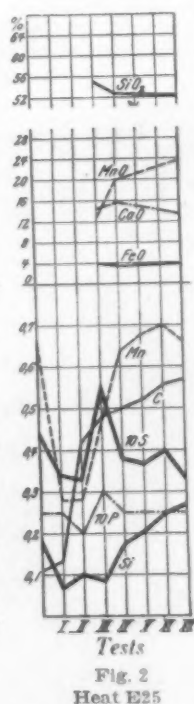
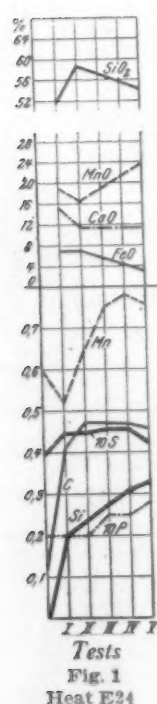
4. Reduction by means of carbon. At a certain temperature the free silica in the slag is reduced, the silicon entering the bath. This reaction is clearly seen during the carburizing period, as for instance with E 24 where the silicon rises to 0.20 per cent., while the carbon increases at the same time by 0.30 per cent. All these reactions are more energetic the higher the temperature of the bath and slag. The reduction from the lining is particularly active with a newly lined furnace, but decreases comparatively quickly, as is readily understood from the analyses given in Table 1. As soon as this reduction is quieter the silicon of the bath can be somewhat regulated by the temperature and composition of the slag, for the ability to reduce silicon from the slag depends on these two factors.

REACTIONS MORE VIGOROUS THAN IN THE BASIC

We see, also, that reactions in the acid electric furnace are more vigorous than in the acid open hearth and on the whole more active than in the crucible. This reduction of silicon is of benefit economically as well as in regard to quality for no addition of ferrosilicon is needed. The silicon reduced during the course of the heat in the body of the steel gives a characteristic quietness to steel deoxidized in the acid electric furnace, and according to Thallner, Geilenkirchen, and Eilander ought to have a particularly good influence on the size of the crystals and structure of the steel. Certainly silicon introduced into the bath in this way is preferable and has a better action than silicon added as ferrosilicon, which must be mechanically mixed with the bath, and often leaves deoxidation products that do not separate from the metal.

While the silicon plays the chief metallurgical rôle the

behavior and the amount of the sulphur is of great importance. The diagrams show that the sulphur is subject to considerable change during the melting, but in most cases the final analysis



the acid hearth and walls. The silicon reduction under normal conditions is mostly from these sources, as for instance in heat E 25.

2. Reduction of silica by increasing the silica

shows a decrease. Desulphurization can be noticed to some extent during the oxidation period, the sulphur probably escaping as SO_2 . This is noticeable with heat E 25. During the reduction period a new desulphurizing influence is active to an extent sufficient to keep the sulphur down to, at least, the original percentage. The petroleum coke for addition to the bath carries in considerable sulphur for instance in heat E 29 the 28 kg. of coke adds about 0.01 per cent. sulphur to the bath. As this is again separated from the bath we can very properly speak of desulphurization in the acid furnace. It is probable that this is effected by the formation of calcium sulphide and sulphide of silicon, SiS_2 , as in the basic process.

An acid slag must be used to preserve the acid hearth and walls. With cold charges the impurities form a slag with oxide of iron, but with liquid charges slag making materials must be thrown in. As in the basic electric furnace process the slags can be separated according to the method of working into oxidation and deoxidation slags. The first is an iron-manganese-silicate slag similar to the ordinary acid open-hearth slag, while the latter can only exist in the real reducing atmosphere of the electric furnace. It can be produced by charging, on to the clean surface of the bath, 75 per cent. crushed silica bricks and 25 per cent. burnt lime, which mixture will soon be liquid without any addition of fluorspar. This produces a totally different acid slag, which also suffers considerable changes during the course of the heat.

For the proper carrying out of a correct slag practice, great care is necessary so as to have a good final slag that will allow good refining, and not cause too great injury to the acid hearth and lining. This question is gone into in some detail. The proper basicity of the slag is best obtained with lime and magnesia and the lime contents are best held between 15 and 20 per cent. The magnesia should mostly vary from 2 to 5 per cent. If greater basicity is desired then it should be produced with oxide of manganese, the most suitable amount being 10 to 15 per cent. Finely crushed ferromanganese can be added to the slag to produce this oxide. If it rises too high a small addition of petroleum coke will quickly reduce it. Table 3 gives typical analyses of permissible slags.

ACID REFINING TO BE PREFERRED

There can be no doubt that in plants where a raw material, sufficiently low phosphorus and sulphur, can be obtained refining with the acid electric process is to be preferred to the basic process—particularly when the highest grades of steel do not have to be made nor the sulphur and phosphorus reduced to a minimum. Without exerting any special care a series of such steels made from open-hearth material gave a phosphorus of 0.02 per cent., and a sulphur of 0.035 per cent. These small percentages exerted no harmful influence on the physical properties of the steels produced, which were not supposed to be of the highest quality. Much more important is the care in working, the melting and finishing of the charge, good slag practice and correct temperatures.

Thallner attributes special influence to the temperatures on the internal structure and quality of the metal. Good melting in the acid furnace is by no means easy, and of course good, carefully made, basic steel is better than poorly made acid material. Extensive practical experience and metallurgical knowledge is necessary to get the best results and have a product that exceeds good basic electric steel. Experience is to the effect that the

higher phosphorus and sulphur contents of the acid steel do not exert a harmful influence on the physical properties, and so it may be assumed that both kinds of steel, with otherwise equal conditions, are equal in quality. The acid process is more economical than the basic, under the conditions given above, and is therefore to be preferred.

SUMMARY OF ADVANTAGES

The advantages may be summed up as follows:

1. Smaller current consumption through shorter

Table 1—Chemical Composition of the Acid and Basic Furnace Material

Constituent	FURNACE HEARTH		ACID WALLS	
	BEFORE THE TEST	AFTER 27	BEFORE THE TEST	AFTER 27
	Basic, per cent	Acid, per cent	Basic, per cent	Acid, per cent
SiO_2	5.72	80.50	85.30	83.50
CaO	46.50	4.30	1.85	3.55
MgO	27.60	1.91	Trace	0.65
Al_2O_3	1.46	3.08	0.58	0.97
Fe_2O_3	1.85	2.38	4.33	4.50
FeO	0.99	1.16	1.93	3.65
MnO	0.40	3.37	12.05	2.36
P_2O_5	0.09	0.02	0.08	0.08
Carbon	8.60	7.75	1.20	.....
Loss on ignition ..	14.35	7.80	.....	.....

Table 2—Details of Several Acid Heats

Method of Working	Test No.	C	Mn	P	S	Si
Heat E 24:						
Open-hearth heat 324		0.12	0.60	0.020	0.040	Traces
18 kg. petroleum coke	1	0.42	0.52	0.020	0.045	0.20
10 kg. ferromanganese	2	0.47	0.64	0.020	0.045	0.24
12 kg. ferromanganese	3	0.47	0.75	0.025	0.046	0.28
.....	4	0.47	0.78	0.025	0.046	0.31
.....	5	0.46	0.76	0.028	0.043	0.33
Heat E 25:						
Open-hearth heat 330		0.11	0.60	0.025	0.044	0.18
20 kg. ore	1	0.13	0.28	0.025	0.031	0.07
20 kg. petrol. coke or old electrodes ..	2	0.42	0.28	0.020	0.033	0.10
20 kg. ferromanganese	3	0.48	0.40	0.030	0.053	0.09
10 kg. ferromanganese	4	0.50	0.64	0.025	0.038	0.18
3 kg. ferromanganese	5	0.52	0.68	0.025	0.037	0.21
.....	6	0.56	0.70	0.025	0.040	0.25
.....	7	0.57	0.66	0.025	0.034	0.27
Heat E 29:						
Open-hearth heat 360		0.09	0.46	0.015	0.030	Traces
28 kg. petrol. coke	1	0.62	0.30	0.015	0.026	0.09
3 shovels sand	2	0.60	0.28	0.013	0.026	0.12
Coke to reduce MnO in slag	3	0.69	0.28	0.010	0.018	0.16
.....	4	0.70	0.28	0.015	0.020	0.23
.....	5	0.74	0.30	0.015	0.020	0.23
Heat E 31:						
Open-hearth heat 383		0.10	0.45	0.015	0.024	Traces
60 kg. ore	1	0.12	0.17	0.020	0.032	0.04
22 kg. coke or electrodes	2	0.51	0.18	0.020	0.039	0.07
(Test in red short)	3	0.56	0.18	0.025	0.042	0.10
(Test in red short)	4	0.58	0.18	0.025	0.057	0.08
20 kg. ferromanganese	5	0.56	0.54	0.025	0.048	0.16
.....	6	0.56	0.44	0.022	0.035	0.19
Heat E 39:						
Open-hearth charge		0.09	0.40	0.015	0.036	0.10
24 kg. petrol. coke	1	0.61	0.44	0.018	0.037	0.13
10 kg. ferromanganese	2	0.63	0.60	0.021	0.043	0.17
15 kg. FeMn, 3 shovels sand	3	0.63	0.74	0.023	0.039	0.26
4 shovels sand	4	0.62	0.78	0.023	0.038	0.26
.....	5	0.60	0.78	0.020	0.037	0.25

Table 3—Slag Analyses of Several Acid Heats

Heat	Test No.	SiO_2	CaO	MgO	Al_2O_3	Fe_2O_3	FeO	MnO	S	P_2O_5	O of base	O of acid
E 24	1	51.50	15.30	3.80	2.60	.....	6.85	18.85	0.25	0.01	.....	.....
.....	2	58.80	11.40	4.30	2.14	.....	6.85	16.30	0.27	0.03	.....	.....
.....	5	54.40	11.50	5.20	1.72	.....	3.35	23.55	0.29	0.03	.....	.....
Oxidizing slag	39.02	5.80	1.50	1.92	2.15	23.90	25.41	0.15	0.20	.....	.....	.....
E 25	3	54.84	14.50	.....	.....	.....	3.85	12.66	0.20	.....	.....	.....
.....	5	52.70	15.80	.....	.....	.....	3.60	20.15	0.12	.....	.....	.....
.....	7	52.60	13.70	3.20	1.52	.....	3.85	23.70	0.13	0.12	.....	.....
E 29	1	52.50	18.75	2.90	1.36	.....	5.80	16.70	0.11	0.05	.....	.....
.....	5	55.80	19.60	4.02	2.02	.....	3.55	13.85	0.03	0.03	1-3	.....
Oxidizing slag	45.10	5.35	2.10	1.75	2.30	23.65	19.30	0.40	Traces	1-2	.....	.....
E 31	3	53.50	29.60	3.10	1.49	0.43	3.60	4.95	0.37	Traces	.....	.....
.....	4	55.20	.....	.....	.....	.....	4.35	5.70	.....	.....	.....	.....
.....	5	54.20	.....	.....	.....	.....	4.25	8.85	.....	.....	.....	.....
.....	6	54.20	23.20	3.05	1.86	0.35	4.05	11.15	0.49	Traces	2-3	.....
E 39	1	58.83	24.29	2.40	1.75	0.29	3.07	8.93	0.39	Traces	.....	.....
.....	2	58.54	.....	.....	.....	.....	2.96	9.59	.....	.....	.....	.....
.....	3	59.78	.....	.....	.....	.....	3.08	11.45	.....	.....	.....	.....
.....	4	57.92	.....	.....	.....	.....	2.58	13.79	.....	.....	.....	.....
.....	5	66.27	15.26	2.03	0.15	.....	2.81	11.68	0.51	.....	1-4	.....

melting time, due to the shortening or absence of the oxidation period. This period is only necessary if the final steel is to have less carbon or manganese than the charge.

2. Saving in deoxidizing agents. All the silicon comes from the lining or the slag. As the deoxidation is more active and continuous than in the basic

process the melting time can be further shortened.

3. Important lessening of the repair and relining costs, as the acid material is much cheaper than dolomite or magnesite.

4. Reduced cost of materials for additions. The final acid slag can be profitably recharged in subsequent heats.

The acid electric furnace process offers therefore important economic advantages, where suitable raw material is available for the charges, and where the highest and special grades of steel are not desired.

G. B. W.

IRON AND STEEL INSTITUTE

An Addition of Nearly 100 Active and Associate Members

At a meeting of the directors of the American Iron and Steel Institute, held on Friday, February 27, at 30 Church street, New York, 21 persons were elected to active membership and 69 persons to associate membership. The lists are given below.

ACTIVE MEMBERS

Fenton, Clarence M., mine superintendent and purchasing agent Columbus Iron & Steel Company, Columbus, Ohio.
Gage, Fred E., superintendent Central Works, American Steel & Wire Company, Worcester, Mass.
Girdler, T. M., general superintendent Atlanta Steel Company, Atlanta, Ga.
Hartley, W. J., superintendent rolling departments, Atlanta Steel Company, Atlanta, Ga.
Hastings, R. W., superintendent mechanical departments, Atlanta Steel Company, Atlanta, Ga.
Hewitt, George W., superintendent blast furnaces at Riverside Works, National Tube Company, Wheeling, W. Va.
Lavelle, Thomas M., engineer Eastern Steel Company, Pottsville, Pa.
Luckie, R. R., superintendent open hearth department, Atlanta Steel Company, Atlanta, Ga.
McGowan, C. L., superintendent wire departments, Atlanta Steel Company, Atlanta, Ga.
Noble, Patrick, president Pacific Rolling Mill Company, San Francisco, Cal.
Phipps, Charles R., superintendent roll department, Lackawana Steel Company, Buffalo, N. Y.
Scammell, Matthew J., superintendent blast furnaces, Maryland Steel Company, Sparrows Point, Md.
Seaton, William Biggs, president Ashland Iron & Mining Company, Ashland, Ky.
Stackhouse, Daniel M., assistant general superintendent Cambria Steel Company, Johnstown, Pa.
Taylor, Arthur W., superintendent open hearth and steel mills, Gulf States Steel Company, Alabama City, Ala.
Tiemann, Hugh P., metallurgist Carnegie Steel Company, Pittsburgh.
Weils, Daniel, vice-president Detroit Seamless Tubes Company, Detroit, Mich.
Williams, Frank B., superintendent New Haven Works, American Steel & Wire Company, New Haven, Conn.
Plummer, James H., president Dominion Iron & Steel Company, Sydney, Nova Scotia.
McNaughton, J. P., sales manager Dominion Iron & Steel Company, Sydney, Nova Scotia.
Martin, —, general superintendent Dominion Iron & Steel Company, Sydney, Nova Scotia.

ASSOCIATE MEMBERS

Allen, Harry J., assistant fourth vice president American Steel Foundries, Alliance, Ohio.
Arnold, John B., Lake Superior iron lands, New York.
Baker, Fred L., president Baker Iron Works, Los Angeles, Cal.
Barringer, Daniel M., geologist and mining engineer, 370 Bullitt Bldg., Philadelphia.
Ball, Wm. Howland, coal and coke agent Solvay Process Company, Detroit, Mich.
Bell, E. H., vice president Railroad Supply Company, Chicago.
Blue, Louis V., vice president Wheeling Mold & Foundry Company, Pittsburgh.
Bolton, Chester C., assistant treasurer Bourne-Fuller Company, Hickox Bldg., Cleveland.
Brown, C. Arthur, water purification engineer American Steel & Wire Company, Chicago.
Burdick, Walter P., vice president Harrow Spring Company, Kalamazoo, Mich.
Colby, Albert L., consulting engineer South Bethlehem, Pa.
Cromwell, John C., blast furnace and steel plant engineer, Cleveland.
Crook, Alfred, general manager Philadelphia Roll & Machine Company, Philadelphia.
Cuntz, William C., general manager and treasurer Goldschmidt Thermit Company, New York.
Dean, William T., sales manager General Electric Company, Chicago.
Derbyshire, Henry E., general manager Chambersburg Engineering Company, Chambersburg, Pa.
Decker, Omar S., iron and steel merchant, Pittsburgh.
Dette, William, iron factor, New York.
Dougherty, Joseph T., assistant in claim department American Sheet & Tin Plate Company, Pittsburgh.
Durant, Harry S., assistant department manager American Steel & Wire Company, Chicago.
Floersheim, Berthold, vice president Best Mfg. Company, Pittsburgh.

Foster, Chas. K., vice president American Radiator Company, Chicago.
Garoute, Park B., assistant department manager American Steel & Wire Company, Chicago.
Graham, Charles J., Graham Nut Company, Pittsburgh.
Green, John L., president Laclede-Christy Clay Products Company, St. Louis.
Hamilton, Alex. K., president M. H. Treadwell Company of Illinois, Chicago.
Hartshorne, Joseph, metallurgical engineer, Pottstown, Pa.
Hutton, Richard D., vice president Laclede-Christy Clay Products Company, St. Louis.
Hazlett, Edward, director Wheeling Steel & Iron Company, Wheeling, W. Va.
Hill Wm. H., vice president American Radiator Company, Chicago.
Hess, Albert J., assistant department manager American Steel & Wire Company, Chicago.
Hirschland, Franz H., general manager Goldschmidt Detinning Company, New York.
Holloway, Harry C., Western agent Rail Joint Company, Chicago.
Hurd, Charles S., iron and steel, New York.
Ingersoll, Winthrop, president Ingersoll Milling Machine Company, Rockford, Ill.
Jones, Evan F., general manager and treasurer Morgan Spring Company, Worcester, Mass.
Knapp, Charles R., contracting manager Heyl & Patterson, Inc., Pittsburgh.
Koppers, Heinrich, by-product coke ovens, Chicago, Ill.
Larkin, Joseph K., iron and steel merchant, New York.
McKee, Walter Smart, vice president Edgar Allen American Manganese Company, Chicago.
Mesta, Charles J., vice president Hubbard Steel Foundry Company, East Chicago, Ind.
Mix, M. W., president Dodge Mfg. Company, Mishawaka, Ind.
Morgan, Wm. R., president Morgan Engineering Company, Alliance, Ohio.
Murray, J. Weidman, sales manager Allis-Chalmers Mfg. Company, Pittsburgh, Pa.
Nutt, James H., secretary Highland Iron & Steel Company, Youngstown, Ohio.
O'Bleness, Henry M., in charge of information bureau Carnegie Steel Company, Pittsburgh.
Parks, H. A., assistant manager fence department American Steel and Wire Company, Chicago, Ill.
Pease, Bernard S., assistant department manager, Steel & Wire Co., Chicago, Ill.
Peters, Richard, Jr., W. J. Rainey Coke Business, Uniontown, Pa.
Poor, Fred A., Western manager Rail Joint Company, Chicago, Ill.
Pooles, John Hudson, consulting engineer in iron mine operations Mesaba Range, Detroit, Mich.
Potter, W. S., president, Alloy Steel Forging Company, Pittsburgh, Pa.
Quincy, Charles F., president, Q & C Company, New York.
Ralston, Joseph T., president, Ralston Steel Car Company, Columbus, Ohio.
Reif, Otto M., V. P. Harbison-Walker Refractories Company, Pittsburgh, Pa.
Russell, N. F. S., general sales manager U. S. Cast Iron Pipe & Foundry Company, Philadelphia.
Rust, Henry B., special representative and engineer Babcock & Wilcox Company, Pittsburgh.
Savage, Harlow Dow, treasurer and sales manager Ashland Fire Brick Company, Ashland, Ky.
Seaver, Kenneth, assistant general sales manager Harbison Walker Refractories Company, Pittsburgh.
Sime, James E., assistant department manager bale, tie and wire hoop department American Steel & Wire Company, Chicago.
Squibbs, Henry A., assistant manager fence department American Steel & Wire Company, Chicago.
Smith, Floyd K., vice president Valley Mould & Iron Company, Sharpsville, Pa.
Stevens, Chas. G., president Chas. G. Stevens Company, Chicago.
Stoughton, Edwin R., sales manager Baird & West, Detroit, Mich.
Strale, Allen, chief engineer H. Koppers Company, Chicago.
Walker, Geo. Johnson, contracting engineer for Heyl & Patterson, Inc., Pittsburgh.
Waters, John C., treasurer National Radiator Company, Johnstown, Pa.
Webster, William R., consulting and inspecting engineer, Philadelphia.
Woodridge, Willis J., electrical engineer, specializing on sheet steel, General Electric Company, Pittsfield, Mass.

The spring meeting of the Institute, heretofore appointed for May 22, will be held at the Waldorf-Astoria, New York.

The American Boiler Manufacturers' Association will hold its twenty-sixth annual convention in New York City, September 1 to 4, 1914, inclusive, with headquarters at the Waldorf-Astoria Hotel. All boiler, tank and stack manufacturers, fabricators of steel plate, also manufacturers and representatives of materials and supplies used by boiler manufacturers, are invited to attend the convention. Complete information will be furnished by F. B. Slocum, secretary, Suppliment's Association of the American Boiler Manufacturers' Association, West and Calyer streets, Brooklyn, N. Y.

The American Railway Engineering Association will hold its yearly meeting at Chicago, March 17 to 20 inclusive, with headquarters at the Congress Hotel. The customary exhibit of railroad appliances will be conducted at the Coliseum during the same week.

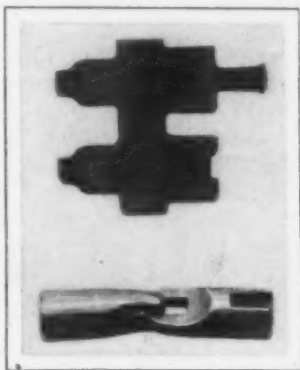
New Type of Flexible Speedometer Shaft

In addition to its line of flexible shafting which was illustrated in *The Iron Age*, April 10, 1913, the Plank Flexible Shaft Machine Company, Grand Rapids, Mich., has brought out a new flexible shaft for use in connection with speedometers. It is of the unit type, the same as the other, and a simple mortise and tenon interlock is used to connect the various parts.

The shaft will be made from No. 16 gauge crucible steel and the blanks will be punched out, two at a time, in an automatic blanking press, the material being fed from a spool. After the blanking operation is completed, the punched parts will be taken to a forming press

where the metal will be rolled into cylindrical shape, and the tenon end of the unit flattened. Throwing the mortise part up into the dovetail slot and swedging the tenon end of the unit to the proper size will constitute the third operation, all of which are automatic. After the units have been formed, the metal will be hardened in oil. It is estimated that these units, which are thoroughly identical, will be manufactured at an average of 50 per min.

Each unit will have a convex traveling collar $1/32$ in. high around its entire circumference, to reduce the friction to a minimum. It is pointed out that with this type of speedometer shaft, a given amount of longitudinal play is allowed between each unit, and the curvature of the shaft will be taken care of without danger of breaking any of the units. The mortise and tenon interlock, which is used, it is emphasized, eliminates the use of rivets, pins, etc., and is simple in construction. Another advantage is that the shaft possesses a practically unlimited amount of flexibility.



The Blank from Which One of the Units of a New Type of Flexible Shaft for Use in Connection with Speedometers Is Made and Two of the Units

Coal Under Government Specifications

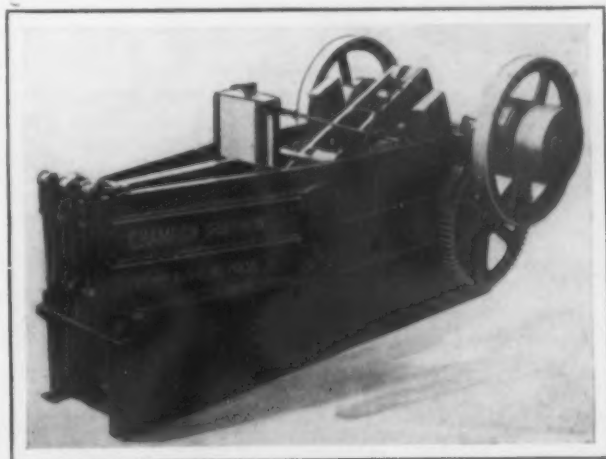
The value of purchasing coal under specifications is to be referred to in the forthcoming annual report of Joseph A. Holmes, director National Bureau of Mines. The cost of purchases of coal for use of the Government now aggregates approximately \$4,500,000 per annum, and the additional fuel bought under general advice of the Bureau aggregates in purchase cost about \$3,000,000 more, a total of \$7,500,000. It is stated that in the case of coal purchased by the Isthmian Canal Commission for the Panama Railroad for the fiscal year 1910 and 1911, the money actually saved by the Government was nearly \$75,000, though the real saving was probably several times these figures because a higher grade of coal was insured than would otherwise have been the case. In a similar way the Quartermaster Corps, War Department, saved \$27,500 in the fiscal year of 1912. It is emphasized also that more than fifty of the largest cities, a number of States and a number of private corporations have adopted the plan.

The 1914 trade excursion of the Merchants' & Manufacturers' Association of Milwaukee, Wis., will be the most elaborate ever attempted by the association. Instead of merely traversing Wisconsin or adjoining States, the excursion will go to the Pacific coast and return, starting May 31 and ending June 15.

Press for Busheling Metal Scrap

A new type of metal scrap busheling press known as the Champion has been perfected by the Famous Mfg. Company, East Chicago, Ind. It is intended for manufacturers who produce scrap in their manufacturing processes as well as for use in scrap yards and rolling mills to press shapeless masses of scrap of every kind into self-contained bushels. The product of the press is made from a variety of scrap including shearings from stove pipe works and scrap punchings from light and heavy plate, as well as old wire and expanded metal shearings. Turnings and borings are handled equally well. The press is self-contained and occupies a floor space of approximately 5 x 8 ft. The standard specifications provide for a belt drive, the operation of the press being controlled by a friction clutch. The machine requires about 5 hp. for its operation, and the pulleys are of a diameter providing for driving at from 450 to 500 r.p.m. The machine is best suited for the busheling of sheet metal scrap of No. 22 gauge and lighter, but with favorable materials it will bale metal as heavy as No. 18 gauge.

The press box into which the scrap is charged has a counterbalanced cover and is designed so that the pressing operation provides for a simultaneous contraction from all four sides, the material becoming clinched and intertwined in a solid and permanently shaped bundle. It is claimed for this press that the manner of contracting the press box makes the surface of the bushel particularly dense and tightly pressed while it leaves the central portion much looser. This condition contributes to the uniform heating of the bushel in the furnace, and is especially desirable for that reason. The



A Recently Developed Press for Busheling a Great Variety of Metal Scrap Including Shearings from Stove Pipe, Light and Heavy Plate Punchings, Old Wire, Expanded Metal Shearings, Turnings and Borings

press is estimated to have a capacity for busheling from 4 to 8 tons of metal daily, depending upon the character of the materials used. The product of the press is a bushel less than 15 in. square, which brings it not only within the requirements of tonnage, but admits of it being readily charged into the furnace.

The United States Government is preparing a series of elaborate exhibits for the Panama-Pacific International Exposition, San Francisco, which will be far more comprehensive than any display ever made by it before and will present a complete record of the activities of the Government in behalf of the people during the last decade. The exhibits will be distributed among all of the various exhibit palaces.

S. DIESCHER & SONS,

Mechanical and Civil Engineers,

PITTSBURGH, PA.

IRON-BEARING MATERIALS

Comparative Reducibility of Ores and Agglomerated and Briquetted Products

In his thesis for his doctor's degree, Ludwig Mathesius, Berlin, Germany, gives the results of experiments regarding the reducibility of various iron-bearing materials in the blast furnace. The work was done during 1912 and 1913 at the Koenigliche Technische Hochschule at Berlin and was extensive in its scope. An abstract of the essential points, furnished by Ernst Stütz, New York, is given in the following:

The materials used were divided into three groups:

1. Ores:
 - a. Spathic ores.
 - b. Minette I.
 - c. Dense red hematite.
 - d. Minette II.
 - e. Magnetite.
2. Agglomerated materials:
 - a. Grondal briquette.
 - b. Magnetite concentrates nodulized in rotary kiln I.
 - c. Roasted pyrite nodulized in rotary kiln II.
 - d. Brown limonite nodulized in rotary kiln III.
 - e. Converter sinter.
3. Briquetted materials:
 - a. Flue dust by magnesium chloride process.
 - b. Flue dust by scoria process.
 - c. Magnetic concentrates by scoria process.
 - d. Flue dust by Dahl process.
 - e. Flue dust by Zellpech process.

After a series of 16 tests a selection was made of the best analytical method of separating metallic iron from ferric oxide and other lower oxygen com-

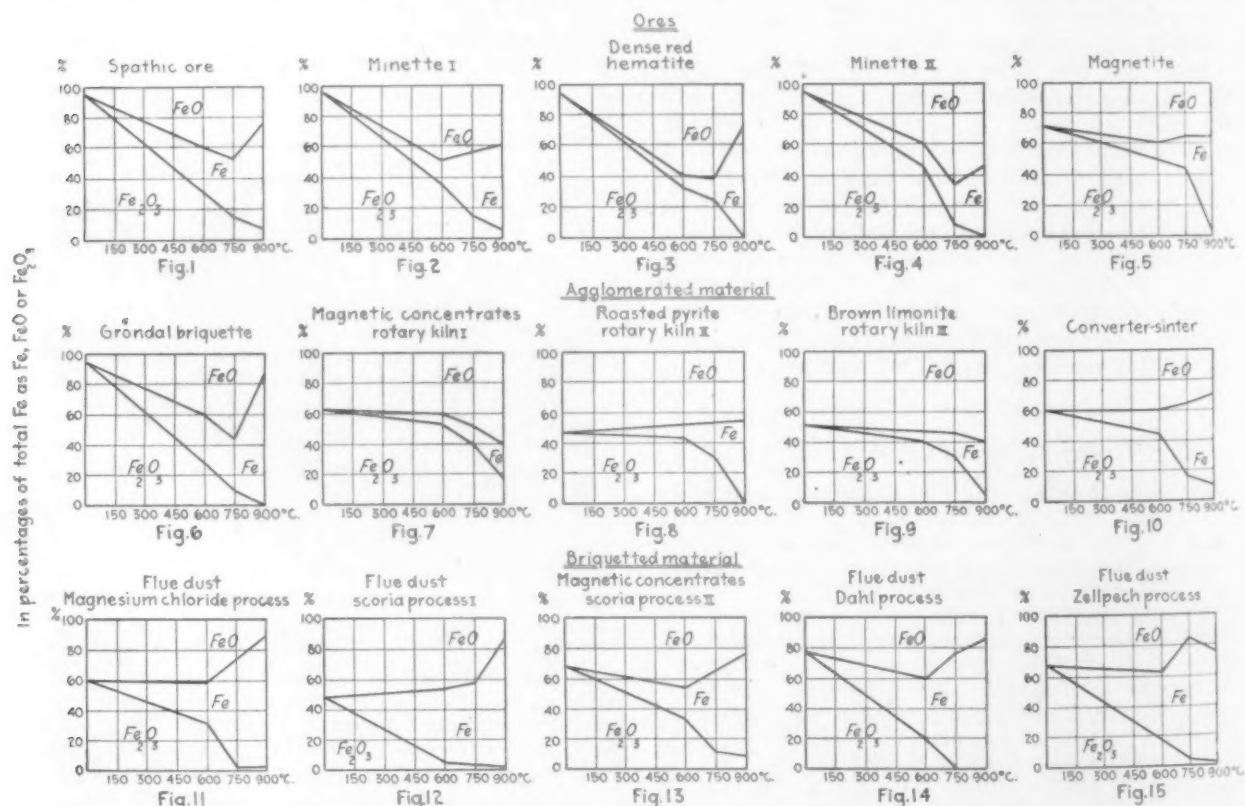
right Heraeus furnace with a heating tube 65 mm diameter and 640 mm long. In this was suspended an iron tube of 50 mm diameter, 5 mm thickness of wall, and 590 mm length, in such a manner that its bottom extended barely into the zone of uniform temperature. This tube was closed at the bottom and the samples poured into it filled a column of a height of 300 mm. A porcelain tube leading to the bottom of the iron tube conducted the gas, preheated to furnace temperature, to the bottom of the charge.

Heat measurements were taken by means of a Pt-PtRh element, the welded joint being located in the lower third of the furnace, and the whole was protected against the influence of the reducing gases by a glazed porcelain tube. All materials were crushed to hazel-nut size to combine ample surface for gas absorption with economical distribution of volume.

The gaseous reducing agents were made to flow in at a temperature of 450 to 500 deg. C. and the furnace heat rose to 600 deg. C. after 45 min. and to 900 deg. C. in about 2 hr. Each sample was roasted for 5 hr. at 600, 750 and 900 deg. C. and allowed to cool in the gas current. The lower third of the sample was then ground and from this the average sample taken as described above.

ILLUMINATING GAS THE BEST REDUCING AGENT

To ascertain the most efficient kind of reducing gas comparative tests were made on Grondal briquetted material with first, hydrogen gas; sec-



binations and it was found that bromium-ammonium-acetate was reliable even in the presence of carbides, lime or magnesia, and manganese; it was therefore used throughout the experiments. The samples to be analyzed were ground to a fineness of 5000 mesh per sq. cm. and particular care was taken to prevent the unmixing liable to occur from differences in specific gravity between iron and lime or magnesia.

The apparatus for testing consisted of an up-

ond, pure CO; third, CO saturated cold with water vapor, and fourth, illuminating gas. By the latter 83.3 per cent. of the total iron content was reduced to metal against 3.9, 22.1, 49.1 per cent. respectively by the other methods and was therefore decided upon as the most reliable for all the tests.

The results are tabulated and shown graphically in Figs. 1 to 15 in which the abscissae indicate temperature in deg. C. and the ordinates the proportion of Fe contents in the form of ferric oxide,

metallic Fe and ferrous oxide. The addition of these three figures which indicate the proportions of the three substances for a given temperature will always total 100. In other words the more obtuse the angle between the lines of the diagram the greater will be the reducibility of the material, and a glance will suffice to show roughly the manner in which the reduction process has progressed.

Of course these lines are only meant as straight connections between certain determined points at 0, 600, 750 and 900 deg. C. The actual increase of reducing action does not follow such straight paths, as is particularly noticeable in the curves of the easily reducible materials. For instance in the case of the Grondal briquette the ferric oxide curve should in reality be first nearer to the horizontal and should then rise steeply, while the metallic iron content should remain at zero for a longer period. Neither must it be assumed that the maximum FeO content of a Grondal briquette is exactly at 750 deg. C.—it may be above or below.

Above 900 deg. C. the tests were not continued as it was found that the majority of ores begin to sinter just above that temperature; they will cake together and are hard to remove from the iron tube without damage to the thermo couple. Furthermore, once sintering has set in, the reducing action of the gas is interrupted. For practical purposes also the results above 900 deg. C. are of little interest, as in the blast furnace, at those temperatures, carbonic acid will be at once reduced to carbon monoxide by the incandescent coke and the effect will be the same as if reduction had taken place in the hearth.

Incidentally it is interesting to note that in the course of these tests the ferric oxide never resisted the influence of the reducing gases, while the ferrous oxide, whether present in the mineral or produced by slow transformation at lower temperatures, could only in a few cases be reduced at less than 600 deg. C., generally above 700 deg., provided a very large surface was offered to the reducing gases. Furthermore in all cases where FeO was irreducible by gas, the reaction appears to have taken place in such a manner that only ferric oxide was reduced to metallic iron.

SUMMARY OF RESULTS

Summarized, the results show first that the ores cannot be reduced by these methods at temperatures up to 900 deg. C. to the extent that practical furnace experience has previously led one to believe. Of the agglomerated material the Grondal briquette alone shows marked reducibility in gas. At 900 deg. C. more than 83 per cent. of the total Fe were reduced to metallic iron, but all other materials of this group behaved like the very irreducible magnetites. In the case of the nodulized magnetite concentrates all that has really taken place is a gradual transformation of ferric oxide to ferrous oxide. Briquetted materials act in just the reverse way. They show their great reducibility at once and in nearly all of them metallic Fe exceeds 80 per cent. at 900 deg. C. and considerable gradual transformation of oxides is hardly ever noticeable.

The reason for the advantage possessed by briquettes in this respect over lump ore seems to lie in the fine division of the material. Ore briquettes have actually an almost infinite number of surfaces, while on the other hand lumpy ores usually, and sinter products always, have a very dense structure and therefore very few surfaces. A comparison between diagrams 16 and 8 and 10 respectively will illustrate this point. In all three cases the material is magnetite concentrate. The tests

also explain that the reducibility of the Grondal briquettes is due not so much to the oxidation at 1400 deg. C. as to the very fine division.

The practical knowledge to be derived from these experiments shows that even at the same cost per ton of material briquetting processes are preferable to sinter processes and if the latter have had wider industrial application this is chiefly due to insufficient practical experience in briquetting. The test runs have so far proved only that the sinter materials, even if hard to reduce, are preferable to fine ores because they are less liable to scaffold.

Agglomerated materials are hard to reduce. They will therefore melt in the form of slag and require solid carbon for reduction. They have an advantage over fine ores because they loosen the stock pile and allow faster driving with fewer irregularities. Ore briquettes on the other hand not only loosen the stock pile but in addition the pieces of ore that reach the hearth have passed through the preliminary reduction treatment and will therefore not draw on the carbon supply from coke to any appreciable extent.

Finally the experiments prove that metallic iron is produced in the blast furnace at a much lower temperature than has hitherto been considered possible. If that were not so, it would not be possible that at a temperature of 600 deg. C. scoria briquettes consist of 50 per cent. metallic iron, Dahl briquettes of 40 per cent. and Zellpech briquettes of 46 per cent.

American Radiator Company's Year

The report of the American Radiator Company for the year ended January 31 indicates the attainment of a new high mark in the company's business. The net profits were \$2,081,267.29, compared with \$1,696,193.19 in the previous year. Foreign plants owned by the company showed \$884,248 in profits, against \$1,004,954 the year before, the decline being in the German and English operations, where the effects of the Balkan war were most keenly felt. To date the surpluses of the foreign plants are \$5,900,785.65 and no dividends have yet been paid by any of these companies, profits being used to extend the business. The combined surpluses of the parent and subsidiary companies at the year-end aggregated \$12,604,976.

The comparative income account of the company for the past two years is as follows:

	1913-14	1912-13
Net profits	\$2,081,267.29	\$1,696,193.19
Less dividends—		
Preferred stock	210,000.00	210,000.00
Common stock	*1,393,590.00	†1,266,900.00
Total dividends	1,603,590.00	1,476,900.00
Surplus for year	\$477,677.29	\$219,293.19

*Cash, \$717,090 and stock, \$676,500.

†Cash, \$651,900 and stock, \$615,000.

President Clarence M. Wooley, in his accompanying remarks, points out the increase in sales made to the constructors of the smaller buildings. This was the direct result of the curtailed construction of large buildings the past year. New plants were added at Bayonne, N. J., and Birmingham, Ala., in 1913 and capacities of old plants were largely increased. Employees at the end of the year were owners of nearly 20 per cent. of the company's stock. The directors have also established a pension fund to meet requirements in individual cases of disability or old age among employees.

The Globe Machine & Stamping Company, Cleveland, Ohio, has adopted a new working schedule reducing its working hours from ten to nine a day and at the same time raising the hour wage rate 10 per cent. to keep wages up to the former basis. The company has increased its capital stock from \$25,000 to \$100,000. No plant extensions are planned.

METHODS OF WELDING

Oxy-Acetylene and Electric Systems Outlined— Some Weld Tests

Modern methods of welding were discussed before the Institution of Mechanical Engineers in London, England, February 20, by Thomas T. Heaton, of the Steel Barrel Company, Ltd., Uxbridge, England. The following notes have been taken from the paper:

ELECTRIC WELDING SYSTEMS

The Benardos system demands a direct current of about 90 volts. The quantity of current used depends on the thickness to be welded, and may in ordinary practice range from 200 to 500 amperes. The work itself forms the positive pole of the arc, and a rod of carbon the negative pole. By this arrangement the greatest amount of heat is in the weld, as the positive pole is the hotter.

Where a number of welders are employed, it is necessary that the current shall be supplied in such a manner that one welder shall not affect the arc of another. This is effected very simply by generating in a compound-wound dynamo of ample capacity, and the machine should be slightly over rather than under-compounded. By this arrangement an increase of load does not lower the voltage. In a well-designed machine the voltage scarcely varies, provided the engine driving it is efficient to maintain its speed. The arcs are arranged in parallel, and each arc is provided with a regulator to adjust the current to the work to be done. The rod of carbon forming the negative electrode is fastened in an insulated holder of light construction. The workman holds this in his hand, strikes the arc by placing the carbon in contact with the work, and manipulates it so as to spread the arc and heat the work at and near the point to be welded with what is described as a soaking heat. When the welding heat is attained the work is hammered or not, according to circumstances. Screens with colored glass windows are used to protect the eyes and skin of the workman from the effect of violet rays.

The Zerener process is an arc-welding system which was introduced by Dr. Zerener, of Berlin, some twenty years ago. In this there are two carbons in the same holder, and there is a magnet which deflects the arc produced between these two carbons downward on to the work. No current passes through the work at all. There have been modifications of this system. The object is to maintain a constant voltage in the arc by having a constant length of arc. In the Benardos process the length of arc varies slightly as the workman moves the carbon nearer to or farther from the work. There is, however, in practice, no disadvantage in this.

The Strohmenger-Slaughter system is worked with either direct or alternating current. Alternating is, the author believes, preferred. The voltage is not very high, and its amount, within limits, not important. He has seen 85 volts used with direct, and 220 volts with alternating current, both effective. The quantity of current depends on the work.

The parts to be welded are placed in juxtaposi-

tion, and an electrode is laid upon and along the welding line. This consists of a soft iron rod covered all over, except at the extreme ends, with a flux which may be constructed chemically to suit the metal to be welded. Contact is made between the work and one end of the electrode, which fuses by a series of arcs along the welding line, melting the electrode into the work and coating the weld with a vitreous flux. It is claimed that this flux prevents oxidation. It flakes off when the metal cools. This system is interesting. The author understands that it is used with success in the welding of rails and their repair by building up worn places, but he has no experience in it beyond experimental demonstrations, carried out to see whether it would supersede efficiently and economically other systems in use.

Electric contact welding is performed by machinery. The Thomson-Houston process was introduced into this country about twenty years ago, and with it the pieces to be welded are fixed in a machine, one immovable and the other in a slide rest. The piece in the movable slide is pressed by means of the screw against the other, and a very heavy alternating current, the amount depending on the area of the weld, is passed through. The electrical resistance of the joint causes a rise of temperature to welding heat, and the movable piece is pressed forward until a complete union is made. A little hammering is sometimes applied to finish the joint.

This system is applied to the welding of hoops for the tires of carts, etc., wheels, angle irons and other comparatively heavy sections, and can also be used to weld wire down to small dimensions. The voltage is very low, only about 2 to 4 volts. The current density per square

inch is about 16,000 amperes to 20,000 amperes.

A more recent method of contact welding is also performed by machinery, but in a different manner, and it is rather delicate in its adjustment as to time and current in relation one to the other. The voltage at the welding point is low. In thin work about 6 volts, and the current, which is alternating, is also low, but the amount depends on the thickness of the pieces to be welded. In this system there are spot welding and roller welding.

In spot welding the work is laid upon a fixed copper contact-piece or electrode. When placed in position a second, movable electrode is pressed upon it immediately above the fixed electrode. Current is then switched on, and in passing from one electrode to the other heats and welds the work. The current is sometimes cut off automatically and sometimes by hand.

In roller welding the system is similar, except that the electrodes are rollers which grip the work overlapped between them, heating and welding it as it travels. This system requires good quality metal; it should be homogeneous, and free from scale or dirt. The adjustment of the time the metal is between the electrodes, and the amount of current required to produce the necessary welding heat and no more within that time, are somewhat difficult to estimate. It is, however, quite a practical system, and can produce most remarkable results in good welding. The greatest care must be exercised to produce these results with regularity.

The spot welds are not continuous, and are like

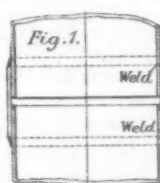


Fig. 1

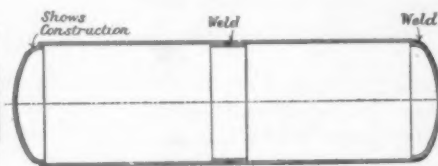


Fig. 2
Welded Joints of Tanks

a series of rivets without rivet holes or heads. They can be made continuous by a series of spots overlapping one another. The roller welds are continuous. The Pontelec system is spot welding, and is similar to the above. But in this system a small disk is placed between the pieces to be welded immediately between the electrodes, and the disk is crushed down into the weld. It is claimed that this disk tends to concentrate the welding heat at the weld more thoroughly than with the spot welding described in previous paragraphs. This contact welding is very economical in labor for small thin work. It requires skilful attention to keep everything properly adjusted.

GAS WELDING

In gas welding the heat is produced by a mixture of gas of more or less good calorific value, with oxygen. The author thinks the best gas is acetylene, but other gases are used in conjunction with oxygen, namely, benzol vapor, coal gas and hydrogen, the last being used more especially on the continent, but acetylene, oxygen and coal gas can be used together.

Of the various systems referred to herein the author regards electric arc welding and oxy-acetylene welding as the two systems most suitable for general application, and the rest for special work. In some classes of work the electric arc is the more suitable, and in others the oxy-acetylene system, while in some cases both systems are equally applicable. Each is more economical in its own sphere. Owing to the lower temperature, the oxy-acetylene flame is better for thin work than the electric arc, because the risk of burning the metal is not so great. The temperature of the electric arc has been calculated as about 7500 deg. F., but will vary with amount of current; that of the oxy-acetylene flame about 6000 deg. F.

In the author's opinion, the electric heat must be far more effective, however, because it is produced within the work itself, whereas the heat of the gas flame is applied entirely from outside. Where the work is suitable for the electric arc, welds can be made far more quickly than by the oxy-acetylene flame. The proportions of the two gases in welding vary somewhat, but should be in the neighborhood of 1.5 volumes of oxygen to 1 volume of acetylene.

TESTS OF WELDS

The author's firm has made welds in gas cylinders which have successfully withstood a pressure of 4000 lb. per square inch, and welds in mild steel tube 3/16 in. thick by 1 1/4 in. in diameter inside, which have withstood an hydraulic pressure of 6 tons on the square inch = 20 tons on the metal.

Much depends on the kind or the quality of the material, which is generally steel or iron. For the generality of this work mild steel made by the open-hearth process or wrought iron cannot be excelled, and the steel should be very soft and low in carbon to get the best results. Bessemer material is not so good, as it varies greatly in the same piece, and therefore often much internal stress exists in it to begin with. The advantage of the kind of welding referred to herein is that, unlike the ordinary blacksmith's work, it is possible to be sure of a sound homogeneous weld.

A cylinder of open-hearth mild steel, 20 in. in internal diameter by 1/4 in. thick, designed as an air receiver for a working pressure of 100 lb. per square inch, and test pressure of 200 lb. per square inch, was submitted to a destructive test some time ago at the works of the author's firm before an engineer from the Admiralty. The cylinder was

6 ft. 9 in. long, made in two sections of length united by a welded joint with a butt strap welded round the cylinder. The two abutting ends of the cylinders joined were kept slightly apart to avoid internal stresses as before described. The ends were both domed outward to a radius of about 24 in., rather too flat, but as specified, and they were 3/8 in. thick. Near one end a hand-hole of oval shape without any stiffening ring was cut out of the body, and a 1/4-in. cover-plate put inside with central bolt and bridge-piece. At 825 lb. pressure per square inch this cover plate pushed through the cylinder sufficiently to split the body in the solid plate. The part thus split was then cut off and the end rewelded in, somewhat shortening the cylinder, and pressure again applied, until at 975 lb. per square inch one end was pushed out. This cylinder had a longitudinal weld made by the electric arc system for its full length. The two ends were flanged, inserted into the ends of the body, and welded in by the oxy-acetylene process. The method of inserting the ends is indicated by Fig. 2.

Naturally, the character of the metal at the weld is changed to some extent. It loses some of its ductility, and some of its strength, but loses far less than does a blacksmith's weld. Many tests have shown that 89 to 96 per cent. of the original strength of metal can be relied on in the electric weld. It has been said, but quite wrongly, that the electric welding hardens the metal by filling it with carbon from the electrode. This is not the case. For example, in welding mild steel the fierce heat of the electric arc burns out all the impurities, more or less, including carbon, and leaves the metal at the weld purer iron. If any hardening effect has ever been found, it has been due to bad manipulation or to the fact that the metal was never of a properly weldable quality, or the polarity was wrong. The accompanying tables are valuable in that they go to show the effects of the welding upon the metal.

Chemical Analyses

Chemical and mechanical tests of acetylene and electrically welded plates, received from Mr. Heaton, of the Steel Barrel Company, Limited, Uxbridge, August 27, 1913.

	Electrically welded		Acetylene welded	
	Unwelded metal, per cent.	Welded joint, per cent.	Unwelded metal, per cent.	Welded joint, per cent.
Silicon	0.009	0.003	0.009	0.002
Carbon	0.15	Trace	0.15	Trace
Sulphur	0.025	0.020	0.085	0.071
Phosphorus	0.068	0.043	0.068	0.067
Manganese	0.64	0.27	0.49	0.34
Iron (by difference)...	99.108	99.664	99.198	99.520
	100.000	100.000	100.000	100.000

Mechanical Tests on Mild Steel 1/4 In. Thick

	Electrically welded			Acetylene welded		
	Unwelded	Transverse welded	Longitudinal welded	Unwelded	Transverse welded	Longitudinal welded
Elastic limit, tons per sq. in.	15.20	17.60	Nil	11.76	11.60	Nil
Breaking weight, 26.66	24.00 = 90 p.c.	25.60 = 96 p.c.		23.14 = 78.8 p.c.	18.24 = 100.2 p.c.	23.20 = 87 p.c.
Contraction of area, per cent.	47.25	Nil	Nil	46.66	49.60	Nil
Extension on 4 in., per cent.	23.16	5.00	0.50	26.33	13.50	4.25
Extension on 2 in., per cent.	30.33	7.00*	1.00†	33.66	22.00‡	8.00

*Broke in weld. †Broke outside gauge length ‡Broke clear of weld.

Mechanical Tests on Two Strips of Siemens-Martin Mild-Steel Sheet, 1/4 In. Thick, by Mr. Jenkins

	Breadth of test-piece	Thickness	Area	Maximum load		Extension on 4-in. length	Reduction of area	Remarks
				On piece.	Per square inch.			
1...	1.460	1/4	0.185	4.06	21.95	22.03	29.62	Original Electrically welded
2...	1.478	1/4	0.185	3.59	19.41 = 88.428 p.c.	10.93	5.23	

ESTABLISHED 1855

THE IRON AGE

Published Every Thursday by the DAVID WILLIAMS CO., 239 West Thirty-ninth Street, New York

W. H. Taylor, *Pres. and Treas.*

Charles G. Phillips, *Vice-Pres.*

Fritz J. Frank, *Secretary*

M. C. Robbins, *Gen. Mgr.*

BRANCH OFFICES—Chicago: Otis Building. Pittsburgh: Park Building. Boston: Equitable Building. Philadelphia: Real Estate Trust Building. Cleveland: New England Building. Cincinnati: Mercantile Library Building.

Subscription Price: United States and Mexico, \$5.00 per year; to Canada, \$7.50 per year, to other foreign countries, \$10.00 per year. Entered at the New York Post Office as Second-class Mail Matter.

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Government Control of Lake Traffic

In line with the movement against all business done on a large scale is the investigation of the management of the ore-carrying fleets on the Great Lakes. The report of the House Committee on Merchant Marine and Fisheries at Washington, which has been probing lake vessel companies, is given in synopsis on another page. From the day of the individually operated boat there has been an evolution through the corporation stage in which one or two or three boats were owned and managed in a single office on to a period of consolidation in which a single company or firm is managing a dozen or a score of vessels. That the new régime has brought down the cost of lake transportation is considered by these investigators as of small account when set beside the fact that in recent years the contract rates for carrying ore have shown a good deal of uniformity. It is admitted that in late years ore has been carried from the head of the lakes to Lake Erie ports at 50 cents a ton; from Marquette at 45 cents a ton and from Escanaba at 35 cents a ton, while coal is carried up the lakes at 30 cents a ton. Those who have followed the statistics of lake freights for years know that 40 years ago a charter from Marquette at \$5 a ton was not uncommon; that 30 years ago \$2 a ton was paid, while 20 years ago the contract rate from Marquette was commonly \$1 a ton.

The inquisitors' report omits entirely any such comparisons as the above, which show how amazing has been the cheapening of lake transportation. Nowhere else on the globe is there a haul that approaches in cheapness the cost of bringing a ton of iron ore nearly 1000 miles from the docks on Lake Superior to the unloading docks on Lake Erie. The latter-day rates cited by the committee figure out from 1-15 to 1-20 cent per ton per mile, yet the only comment of the investigators is that despite these favorable rates the dividends of the leading lake carriers for five years show that the business was a profitable one! The high crime of these lake carriers has been that they made a profit. If the truth were told it would be shown to have been a very meager one in the past five years, after due allowance is made for depreciation; and some lake vessel investments can be named that have yet to pay a dividend.

No violation of the Sherman act is alleged in this concentration of lake vessel interests; nor is any act detrimental to the public interest. Con-

trary to intimations lately given from the Department of Commerce that the smaller competitive unit in industry is more efficient than large consolidations, the committee finds great improvements in lake transportation, as strong, well-managed companies have become the rule. There is no proposal to separate these companies into their elements, as with the large corporations the government is now prosecuting. The great capacity shown for bettering transportation service on the lakes is held to mean also great capacity to exercise the hurtful powers of monopoly; hence, we come to the inevitable proposal of government regulation. For good or for ill such a development in lake transportation seems not far ahead.

The Southern Pig-Iron Rate Case

In deciding the case of freight rates on Southern pig iron, lately argued before it, the Interstate Commerce Commission will be glad to take cognizance of the question of cost of rendering the service, a factor which for many years it refrained from openly considering in its decisions. So conspicuous was its avoidance of that feature that its first decisions that featured the cost of performing the service as a prominent influence were hailed as marking a new era in the commission's procedure.

In the Southern pig-iron case the arguments presented by the opposing parties, practically the Southern pig-iron producers and the Northern pig-iron producers respectively are of such a conflicting and confusing nature that the commission should be very happy to be in position to judge the issue upon the basis of the cost of the service.

As railroad rate matters are now viewed, a strong contention of the Southern producers is one which would hardly carry great weight, that contention being that the freight rates used to fluctuate according to the market price of pig iron, but that unfortunately they chanced to stop fluctuating at a time when pig-iron prices and freight rates were high, the last change in the rate to Cincinnati being April 1, 1907, an advance to \$3.25, while since then pig iron has become relatively cheap. That pig iron was then high is readily shown by the fact that our quotation on Southern pig iron, delivered Cincinnati, stood for many weeks at \$26, but under date of April 10, 1907, our quotation dropped \$1.25 to \$24.75, and there were continued declines thereafter. The freight rate had been advanced just on the eve of a great decline, but that was not an unfamiliar incident. It was commonly observed in

those years when iron and steel rates, and particularly pig-iron rates, were changed at relatively frequent intervals, that advances in the rates were usually made just when the market had reached its top, while conversely reductions were commonly made when the market had reached its bottom and was ready for an upturn.

To reduce the Southern pig-iron freight rates, not because they are in themselves high but because pig iron is low, would be quite out of line with the tone of recent decisions of the commission. The railroads themselves refuse to admit that anything nowadays is cheap except the services they render.

Equally difficult of serious consideration is one of the contentions of Northern blast furnaces that pig iron has become a local commodity, and that if the claims of the Southern furnaces were recognized some of the Northern districts would have ground for insisting that their rates should be reduced in order that they might reach the natural territory of another district. Such a contention loses sight of the important fact that the Southern furnaces have their ore and coke right at the furnace, while the Northern furnaces draw their raw materials from a great distance. The ore of the Northern furnaces is strictly north of them, while the coke is south or southeast. The flow of material is that Southern pig iron moves north and Lake Superior iron ore moves south. Once this ore is moved southward there is no occasion for the resultant pig iron to move northward again, or even crosswise. The long haul of the ore largely takes care of the geography, whereby the pig iron is not to be expected to move far except in special cases, as of Buffalo pig iron moving eastward. In the case of the Southern industry, on the other hand, nature established a remarkable situation of ore and coking coal being close together, whereby it becomes natural that the pig iron made therefrom should travel a long distance, if the cost of producing the pig iron, plus the further cost of moving it, makes a competitive market price. It is for the Interstate Commerce Commission to adjust the rates on Southern pig iron, if adjustment is required, to the cost of that movement, including in the charge a reasonable return to the carriers.

To Prohibit Foreign Trust Products

An interesting suggestion was made last week before the Judiciary Committee of the House of Representatives by Horace Stern, a Philadelphia attorney. The anti-trust programme was under consideration and Mr. Stern urged the broadening of the scope of the Sherman anti-trust law so as to embrace foreign trusts and combines. He advocated that a prohibition be established against the sale within the United States of goods manufactured or owned by such foreign trusts, or sold here under price maintenance agreements entered into in foreign countries. He claimed that these associations are merely pocketing, as additional profits, the tariff duties formerly collected by our own Government. He might, however, have touched upon another phase of the activity of such combinations, which is that when necessary they extend to their members the benefit of an export bounty fund which is provided for the purpose of forcing

an entry into foreign markets. If domestic combinations are to be completely prevented, foreign combinations should not be permitted to reap advantages here.

Prodding the Commerce Commission

Most business men will applaud the efforts of Congressman Jefferson M. Levy to hasten action by the Interstate Commerce Commission on cases brought before it. Mr. Levy has introduced into the House of Representatives a bill making it compulsory on the commission to decide all cases within 60 days after the conclusion of hearings. Criticising the action of the commission in suspending applications for rate advances until hearings are held on them, Mr. Levy is reported as saying: "When a road proposes a rate increase, the commission immediately suspends the action until it decides whether it will grant the request or not. This suspension is pro forma—by clerks upon a printed form. The merit of the advance is not taken into consideration at all. The railroads are forced to await the action of the commission, which usually takes from six to nine months, no matter how necessary the increase may be." Mr. Levy even goes further by asserting that if the commission does not render a decision in the Eastern railroad rate cases within the next 30 days he will seek the impeachment of its members for negligence.

An illustration of the commission's deliberate methods was given the past week when a report was issued criticising the bookkeeping of the Chicago, Milwaukee & St. Paul Railroad in 1910, or over three years ago. It is remarkable indeed that so long a time should have been permitted to elapse after the discovery of this alleged irregularity before making it public. To have a proper effect on other railroad companies, it would seem that the commission should have announced its discovery and made its criticism of the railroad as quickly as possible. It is further remarkable that the report should be made public at this particular time, when the railroad companies are steadily accumulating public sentiment in favor of the desired increase in their freight rates. It was, however, an opportune time, if the commission really desired to let the public know how it had been fortifying itself with information detrimental to railroad companies. The pronouncement would perhaps have been more effective if the commission had been able to present a case of this kind against some large Eastern railroad system instead of one extending from Chicago to the Pacific coast.

As the commission is sitting in judgment on the management of railroads, and appears to question in every way the efficiency of railroad management and practice, the question naturally arises whether that body itself is running its own affairs efficiently. As it has on its staff an exponent of efficiency in the person of Louis D. Brandeis, it might be well to have him probe the internal workings of the commission and develop a system whereby its decisions could be rendered in shorter time. The members of the commission certainly need to be more imbued with the modern idea of dispatching business.

Progress in the Rail Problem

A recent report by Dr. P. H. Dudley, of the New York Central Lines, and a paper before the American Institute of Mining Engineers by Robert W. Hunt, both printed in these columns, have brought up anew the rail problem. Elsewhere in this issue a third independent article, originally contributed to the Railway Age Gazette by Robert Job emphasizes important facts as to rail failures. All are a reminder that the two years that have elapsed since the conferences in New York between presidents of railroads and presidents of steel companies, while they have not been marked by sensational publicity on this subject, have seen more serious work by railroads and steel companies, and it is fair to say more progress, than any other two years have yielded.

Dr. Dudley finds that the internal transverse fissures which develop into broken rails are not found in ordinarily pure metal of medium composition and normal ductility but appear in abnormal metal of decided fragility or limited ductility in the head. As a result of many tests on rails from different mills and of varied conditions and length of service, whether from high or low carbon or A, B, C or D rails, he finds that these defects are incident to conditions of manufacture of the rails which should and can be avoided. He points to the fact that this type of failure is unknown in three brands of basic open-hearth rails of limited output and rare in the product of two large producers, while not uncommon in that of others. Dr. Dudley adds that weakness may be induced by modern traffic conditions in unsound metal, but that rails of normal metal, taken next to rails developing such defects, showed no weakness.

The conclusions of Robert Job, in the article in another column, are similar to those just cited. He has found these internal transverse cracks in both Bessemer and open-hearth rails of high or low carbon, but only where the metal was manifestly poor. His work is also a corroboration of the interesting investigations of a prominent Austrian metallurgist who, even in low carbon rails, has found such fissures developed only where the metal was defective because of faulty manufacture.

Captain Hunt insists with renewed emphasis that since any reduction in size of equipment or in rapidity of service is now impossible, the way out is in increased insurance against unsound rails. He repeats what he has said many times, that the tendency of modern mill practice, with wages based on tonnage, is to the production of too much steel that is unfit to be incorporated in rails. In the same connection he does not omit to say that the service the railroads now impose upon rails must be met by heavier sections, even though they may have less resistance to abrasive wear. Rail manufacturers have long urged heavier rails and the validity of this contention is now recognized by the Pennsylvania Railroad in calling for a considerable percentage of 120-lb. rails for delivery this year.

The two years since the New York conference have largely dispelled the fear that then had some ground, that State and Federal commissions would rush pell mell into the rail controversy, bringing on an endless round of attack and counter-attack. The

possibility of such a calamity has had the good effect of spurring both the railroads and steel companies to greater effort on the basis of a better recognition of their mutual responsibilities. Investigation has gone steadily on and the best talent in the two camps has been at work, not with the idea that either side is to put upon the other the responsibility for all that is bad in the rail situation. Rather there has been a frank interchange of information and a freer co-operation than has ever been possible heretofore. A vast amount of new data has been collected, and the situation is gradually clearing. Time is a factor that must be reckoned with, for only service tests of rails rolled in the past few years can answer some of the most important questions now at issue.

Large Koppers Coke Oven Plant for South Bethlehem

The H. Koppers Company has contracted with the Lehigh Coke Company, New York, to build 424 by-product coke ovens at South Bethlehem, Pa. The new plant will be in four batteries of 106 ovens each and will be capable of carbonizing 6000 tons of coal a day. It is stipulated that the first two batteries shall be completed in 300 working days. These will be built at the east end of the present by-product coke plant of the Lehigh Coke Company at South Bethlehem, which consists of four batteries of 75 ovens each, constructed by the Didier-March Company.

The third and fourth batteries of the Koppers ovens will be built on the site of two batteries of the present plant. As the latter are to be wrecked, the contract calls for the completion of the new batteries Nos. 3 and 4 in 360 days from the turning over of one-half the present plant to the Koppers Company erectors. It is understood that the existing coke ovens will be kept in operation while the first half of the new plant is under construction and later half the present plant will be producing coke up to the entire completion of the Koppers ovens.

The Didier-March Company, which built the present ovens, is the American organization of the Stettin Refractory Products Works, successors to Didier of Stettin, Germany, and the latter company is associated with the Berlin-Anhaltische Maschinenbau A. G. In *The Iron Age* of May 29, 1913, a statement was given of facts brought out at the annual meeting of the Stettin company at which reference was made to the inadequacy of the 300 ovens at South Bethlehem to meet the contract requirements as to the amount of coke to be delivered to the Bethlehem Steel Company. It was then stated that it would be necessary to build an additional number of ovens to make sure that the daily product required by the contract would be attained even under unfavorable conditions.

To prove that electric generators are being built that require no outside protection from external short-circuits, the engineers of the Westinghouse Electric & Mfg. Co. short-circuited a 16,700-kva, 8800-volt generator when running at full speed without any resistance or other protection in the circuit. Records made show that a current of 21,000 amperes, or about 12½ times the normal amount, flowed through the generator, but the only visible effect was a static flash between the field and the armature. In connection with this test several others were made to prove the reliability of circuit-breakers and reactance coils for protecting the feeder circuits. It is stated that the tests were entirely satisfactory and that no damage was sustained by the generator or any of the apparatus tested.

Youngstown Sheet's New Stock Issue

In regard to the new issue of common stock by the Youngstown Sheet & Tube Company, Youngstown, Ohio, which will amount to 20 per cent. of the present total amount of the issued and subscribed common stock, Richard Garlick, treasurer of the company, explains the terms under which it will be issued, as follows:

1. Each person who, on March 1, 1914, appears on the books of the company to be the holder of common stock, will have the right to subscribe for an amount of this stock equal to 20 per cent. of his then holdings of common stock.

2. As soon as practicable after March 1, 1914, the treasurer will notify each holder of common stock, by mail, of the number of shares for which he is entitled to subscribe.

3. This stock will be offered to the common stockholders at par, or \$100 per share, to be paid for as follows: 25 per cent., July 1, 1914; 25 per cent., October 1, 1914; 25 per cent., January 1, 1915; 25 per cent., April 1, 1915.

4. Subscriptions to this stock must be made on or before April 1, 1914, on blank forms of subscription which will be mailed to the stockholders in due time.

5. This stock will not be entitled to receive dividends until after April 1, 1915.

6. In all cases in which the prorating of this stock shall result in a fraction of a share, the stockholder shall have the right, at his option, to purchase an additional fraction of a share sufficient to make up a whole share, by paying for such additional fraction of a share at the rate of \$175 per share, or he may sell to the company, at the same rate, the fraction of a share to which he is entitled. As an illustration of this, if a given stockholder's pro-rata of this new stock should amount to $20\frac{1}{4}$ shares, he would have the right to take 21 shares by paying for $\frac{1}{4}$ of an extra share at par, or \$75 for the $\frac{1}{4}$ share, and for the additional $\frac{1}{4}$ share at the rate of \$175 per share, or \$43.75 for the $\frac{1}{4}$ share; or, the company will purchase the right of such stockholder in the $\frac{1}{4}$ share at the same rate, computed thus: $\frac{1}{4}$ of a share at \$175 equals \$131.25, this amount less \$75 being par for the $\frac{1}{4}$ of a share equals \$56.25, which would be the amount the stockholder would receive for his subscription right to such fraction of a share.

The Granite City Steel Company, the steel department of the National Enameling & Stamping Company, at Granite City, Ill., has resumed work with a full force of men, most of whom have been idle since Christmas, only a small shift working four hours a day having been maintained since that time. The enameling plant has also increased its force to practically full capacity. The plant of the American Steel Foundries at the same place, it is stated, only awaits the completion of repairs to resume operations. The Commonwealth Steel Company has run its works steadily and is reported as increasing its force practically to capacity.

The A. J. Lindemann & Hoverson Company, Milwaukee, Wis., was awarded \$2280.04 damages against the Toledo Machine & Tool Company, Toledo, Ohio, on its counterclaim for \$20,000 to the original suit of the latter to collect \$5000 for machinery sold to the former. The buyer refused to pay for its purchase, claiming delivery was 60 days late, and, when the seller brought suit to collect, entered a counterclaim for damages for loss due to delayed delivery. The seller's complaint was dismissed and an award of damages given to the buyer.

A. C. Pessano, president Great Lakes Engineering Works, Detroit, Mich., announces the booking of an order for a Welland Canal size bulk freighter for interests represented by J. L. Crosthwaite, of Buffalo. The vessel will be 256 ft. in length with a beam of 43 ft., and will be equipped with a triple compound engine and two Scotch boilers. The ship will be operated on the lower lakes and the St. Lawrence River.

The monthly meeting of the Pittsburgh Foundrymen's Association was held in the Fort Pitt Hotel on the evening of March 9. It was preceded by a dinner. The meeting was addressed by C. S. Koch, president Fort Pitt Steel Casting Company, McKeesport, Pa., on "Some Features in the Manufacture of Small Steel Castings as a Specialty."

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Report of La Belle Iron Works

The report of the La Belle Iron Works for the year ended December 31, 1913, shows that the profits for the year, after deducting \$648,200 for maintenance and repairs and \$297,299 to provide for exhaustion of minerals and extinguishment of lease values, were \$1,629,148, against \$1,177,981 for 1912, when \$608,800 was spent for repairs and maintenance and, \$71,522 was deducted on the account of mineral exhaustion. The surplus for the period was \$521,922, but \$250,000 was added to the general depreciation reserve, which now amounts to \$1,481,547. Cash dividends were paid at the rate of 8 per cent. on preferred and 2 per cent. on the common stock. President W. D. Crawford, in his report, states that production amounted to 256,659 tons of pig iron, against 263,867 tons in 1912; 327,864 tons of billets and slabs, against 322,603 tons in 1912, and 401,982 tons of finished material, against 418,487 tons in 1912. The average number of workmen was 3980 and the average wage payment to the individual was \$895 as compared with \$829 in 1912.

The production of iron ore in France for 1913 was 21,500,000 metric tons, as compared with 18,808,000 tons in 1912. The home consumption for 1913 is estimated at 12,900,000 tons, while for 1912 it was 11,936,900 tons.

PIG-IRON CAPACITY MARCH 1

Furnaces Active Represent a Yearly Output of 26,000,000 Tons

Our returns for February pig iron production, printed last week, showed a total of 1,888,813 gross tons of coke and anthracite iron, or 67,458 tons a day. Belated returns from the few furnaces whose output was estimated make but little change, the revised figures showing a total of 1,888,670 tons or 67,453 tons a day. Last week's figures were not received in time to compute the capacity of active furnaces in the various districts on March 1, and these are now given together with our monthly chart, showing the curves of production and prices. The capacity of the 218 furnaces in blast March 1 was 71,399 tons a day, against 63,130 tons a day on February 1. Thus the rate of production on March 1 represents a yearly output of about 26,000,000 tons, or 3,000,000 tons a year more than was represented by the furnaces in blast one month previous. An estimate for charcoal iron, based on the rate of the last half of 1913, would bring the above figure up to 26,300,000 tons a year.

CAPACITY IN BLAST MARCH 1 AND FEBRUARY 1

The following table shows the daily capacity, in

gross tons, of furnaces in blast March 1 and February 1 by districts:

Location of furnaces	Total number of stacks	Mar. 1 Number in blast	Mar. 1 Capacity per day	Feb. 1 Number in blast	Feb. 1 Capacity per day
New York:					
Buffalo	19	11	3,757	9	2,915
Other New York	7	1	200	1	195
New Jersey	7	2	363	2	366
Pennsylvania:					
Lehigh Valley	22	9	2,289	9	2,360
Spiegel	2	1	82	1	82
Schuylkill Val.	16	5	1,420	6	1,636
Lower Susquehanna	7	2	525	2	552
Lebanon Valley	10	4	645	4	665
Pittsburgh Dist.	52	40	17,995	33	15,382
Spiegel	4	1	140	2	257
Shenango Val.	19	12	3,985	10	3,572
Western Pa.	27	13	4,085	12	3,645
Maryland	4	0	0	0	0
Wheeling Dist.	14	10	3,493	9	3,287
Ohio:					
Mahoning Val.	25	16	6,950	13	5,615
Central and Northern	24	16	6,105	14	5,145
Hock'g Valley, Hang'g Rock, & S. W. Ohio	15	8	952	10	1,410
Ill. and Ind.	34	21	9,085	17	7,425
Spiegel	2	1	152	1	160
Mich., Wis. and Minn.	10	7	1,589	7	1,535
Colorado, Mo. & Wash.	8	2	666	2	680
The South:					
Virginia	24	8	960	8	1,010
Kentucky	5	2	236	1	120
Alabama	46	21	5,105	19	4,765
Tennessee	20	5	620	4	541
Total	423	218	71,399	196	63,130

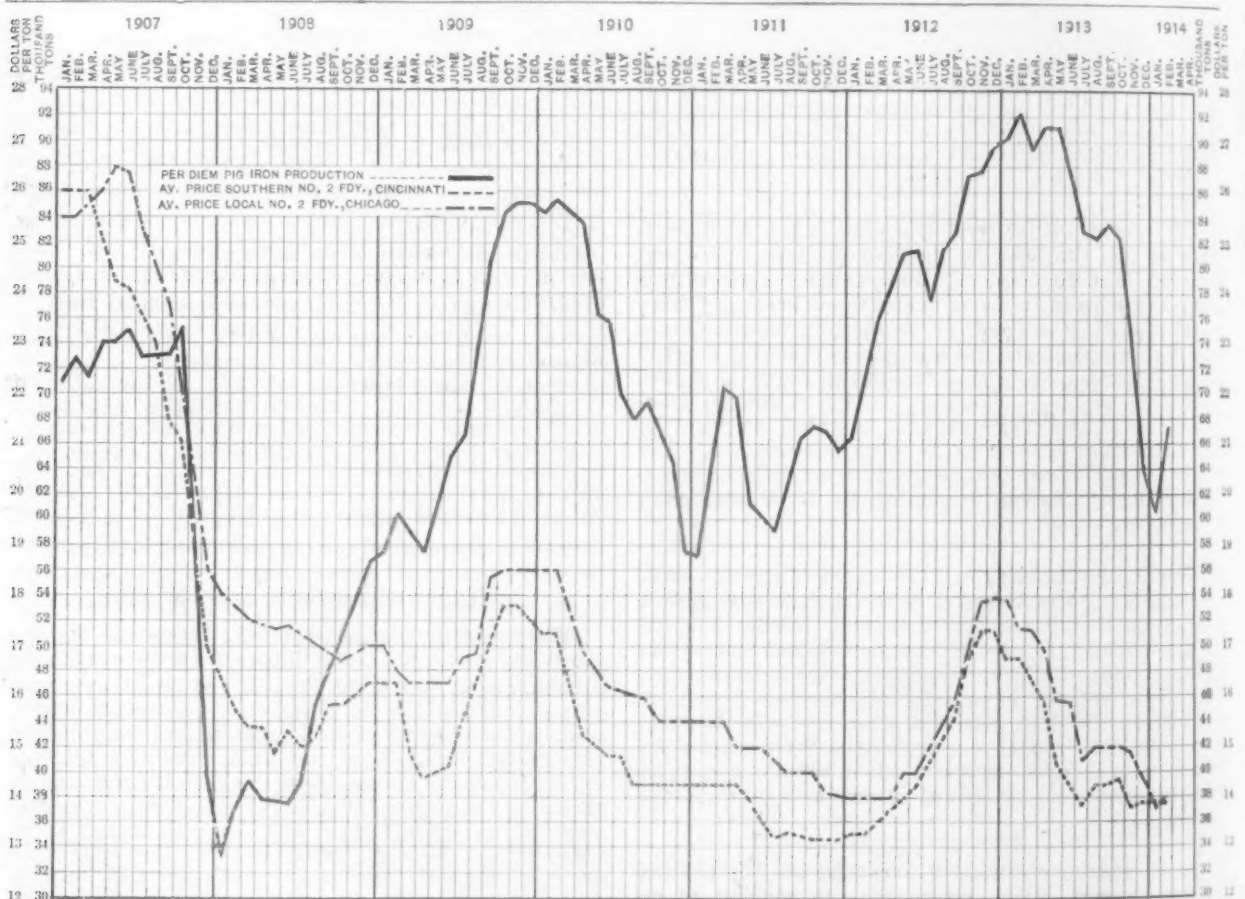


Diagram of Daily Average Production by Months of Coke and Anthracite Pig Iron in the United States from January 1, 1907, to March 1, 1914; Also of Monthly Average Prices of Southern No. 2 Foundry Iron at Cincinnati and Local No. 2 Foundry Iron at Chicago District Furnace

A freight rate of 60 cents per 100 lb. has been made on machinery exhibits from New York to the Panama-Pacific Exposition in San Francisco, according to advices received from the exposition authorities. It is stated that exhibits may be sent at this rate by way of Galveston and thence overland to San Francisco, or through the Panama Canal by the all-water route.

The Northern Pacific Railroad has lengthened the day for its shop workers at St. Paul from nine to ten hours.

Because the splint coal of Scotland has nearly all been worked out some of the blast furnaces there are using half coal and half coke in the charges, resulting in a larger output. At the Carron works the unusual record has been made of 2200 tons of pig iron per week, the increase being due to the percentage of coke used.

South Russian iron and steel companies are tending to acquire their own coal and iron mines. This has already been done by many large plants, and smaller ones are following the example.

METAL TRADES MEETINGS

PROGRAMME FOR METAL TRADES CONVENTION

The principal features of the programme for the sixteenth annual convention of the National Metal Trades Association, to be held at Worcester, Mass., April 22 and 23, have been arranged as follows:

Wednesday, April 22. Secretaries' meeting, 8 a. m. Meeting of local presidents, secretaries and Administrative Council, 10 a. m.; buffet luncheon to members, 1 p. m.; opening session of convention, 2 p. m.; annual dinner, 7 p. m.

Thursday, second session, 9 a. m. Meeting of incoming Administrative Council, afternoon.

The executive committee will meet Monday, April 20, at 6 p. m. An Administrative Council meeting will be held April 21 at 10 a. m., and the alumni dinner at 7 p. m.

THE CLEVELAND BRANCH ANNUAL MEETING

The annual meeting of the Cleveland Branch, National Metal Trades' Association, was held at its office in Cleveland, Ohio, March 5. Departing from its usual custom of having either a banquet or luncheon, the branch held only a business session. President James H. Foster discussed various matters of interest to the members and a talk on the work of the association was given by W. H. Van Dervoort, Root & Van Dervoort Engineering Company, Moline, Ill., a member of the Administrative Council of the National Association. The report of Franklin Schneider, treasurer, showed that the financial affairs of the branch are in a very satisfactory condition and that the reserve fund was increased during the year.

Secretary Philip Frankel, in his annual report, called attention to the fact that not a single strike has occurred in Cleveland in the factory of any member of the association since 1907. He announced that four large companies had joined the branch during the year, namely, the Cleveland Twist Drill Company, Standard Welding Company, Osborn Mfg. Company and United States Brass Mfg. Company. The one noteworthy new departure of the association during the year was the establishment of an employment bureau separate from the offices of the association and under the charge of a skilled mechanic, who understands the employment of men. This bureau has been in operation about eight months and its work during that time has proved that it is going to be a great help to Cleveland factories. During the year the association conducted through its expert safety inspector two inspections through factories of members for the purpose of making suggestions with the idea of preventing or minimizing accidents. The report characterized the Bacon-Bartlett anti-injunction bill, which is now pending in Washington, as the most vicious piece of class legislation ever attempted. Attention was also called to a movement on foot to unionize the automobile workers of the United States. This movement, it is stated, was started in Detroit and from there has been transplanted to Cleveland, where three organizers have been located. However, it was stated that because of business conditions the efforts to organize these workers has been postponed.

The employment bureau was a subject of considerable discussion by the members, and while no definite suggestions for making its work more beneficial were offered the association expressed itself strongly in favor of the bureau and instructed the officers to do whatever in their judgment will make the bureau more efficient than it is at present.

Officers for the year were elected as follows: President James H. Foster, Hydraulic Pressed

Steel Company; vice-president, Christian Girl, Perfection Spring Company; treasurer, Franklin Schneider, Van Dorn & Dutton Company. Executive board—W. H. Starring, Peerless Motor Car Company; A. W. Foote, Foote-Burt Company; J. H. Cox, Jr., Cleveland Twist Drill Company; J. H. Francis, Kilby Mfg. Company; N. S. Calhoun, Johnston & Jennings Company.

THE CINCINNATI BRANCH ANNUAL MEETING

The Cincinnati Branch, National Metal Trades' Association, held its regular annual meeting and banquet at the Hotel Gibson, Cincinnati, on the evening of March 5, President P. O. Geier presiding.

Assistant Secretary John M. Manley submitted his report, which dwelt in detail with the work of the association along the lines of industrial education for employees. He called attention to the fact that Cincinnati in 1906 established a co-operative course in engineering, the first experiment of its kind in the world. In 1909 the first continuation school in America was started in Cincinnati, and this advance constructive work was directly instigated by members of the association. The questions of safety and hygiene of employees were also commented upon, attention being directed to the work of the association along these lines. An expert safety director is employed whose services are free to all members.

The speakers introduced by President Geier were J. W. Harrington, Harrington & Richardson Arms Company, Worcester, Mass.; W. A. Layman, Wagner Electric Company, St. Louis, and president of the National Metal Trades' Association; L. P. Alford, editor American Machinist, New York; C. E. Hildreth, Whitcomb-Blaisdell Machine Tool Company, Worcester, Mass., and secretary of the National Association; F. C. Caldwell, H. W. Caldwell & Sons Company, Chicago; W. H. Barr, Lumen Metal Company, Buffalo, and president of the National Foundrymen's Association, and T. M. Jones, Moline, Ill.

One of the principal subjects of the different speakers was the question of extending the industrial educational plan, while the matter of closer co-operation between employer and employee was suggested as a part solution of the labor problem. In emphatic language, several speakers denounced "freak" laws that have been proposed, and in some States passed, ostensibly for the benefit of the workman, but that, in most cases, were framed for political purposes.

B. B. Quillen, chairman of the nominating committee, submitted the following names of officers to serve the coming year, all of whom were unanimously elected: President, Murray Shipley; vice-president, J. B. Doan; secretary, M. E. Lyon; assistant secretary, John M. Manley; treasurer, A. H. Teuchter. New members of the board of directors elected are John S. Littleford, John A. LeBlond and D. T. Williams.

Canada's Lack of Iron Ore

Following a discussion on the present status of the iron industry in Canada, a resolution was adopted last week by the Canadian Mining Institute, in session at Montreal, calling the attention of the Dominion Government to the fact that the iron industry was greatly handicapped because extensive deposits of the same high-grade ore as were found in the United States, Newfoundland and Cuba had not yet been located in Canada, although it was believed that they existed and that they could be found should endeavors be made. The Institute therefore urged the government to take such means through the proper channels as would determine the extent and value of Canada's iron resources.

The Iron and Metal Markets

NEW BUYING IS LIGHTER

Spring Demand Not Yet a Factor

Steel Corporation's Large Gain in February Not Likely to Be Duplicated in March

In the finished steel trade the first part of March has been disappointing. There is the hope that as the active season advances improvement will come, but little evidence of such improvement is seen as yet. Those who would stem the tide of unfavorable sentiment which lately has been rising recall that just two years ago the feeling in the trade was far from confident, but April brought a broad buying movement in many lines.

The statement of the United States Steel Corporation showing a gain in unfilled orders of 412,000 tons in February, or 14,700 tons a day, gives a better account of that month than was indicated by much of the February comment on the market. Some of the published explanations of the gain are not borne out. It is understood that the Standard Oil Company's annual contract for plates and pipe is not included, this business only going on the books as specifications are received. Concerning the reported cutting down of shipments by snow, it is stated that the subsidiaries had no such handicap in February.

So far as can be learned, independent steel companies did not make gains in unfilled orders last month in proportion to those of the Steel Corporation. Some of the former, however, have had a fuller blast furnace operation than the Steel Corporation for some time, the Corporation's percentage now being 75 after the blowing in of one furnace each last week at the Joliet, Duquesne, Belaire, Newburgh and Shoenberger plants and the blowing out of one Central furnace at Cleveland. The Steel Corporation has 80 per cent. of ingot capacity active this week.

Our reports from important market centers show that while consumers want all the steel they bought in the January spurt, new orders are not heavy and on some products, as plates, shapes and bars, the advance which was asked in February is not being maintained. At Chicago the Pittsburgh basis is again more difficult to hold, plates and shapes as well as bars having sold in some cases below a 1.20c. Pittsburgh equivalent.

Sentiment at Chicago is influenced by the continued lack of railroad demand and the conditions which have unfavorably affected certain implement companies.

Structural business reported from the West is swelled by two large contracts—the Memphis bridge, for which the Pennsylvania Steel Company will furnish 17,000 tons, while the Virginia Bridge & Iron Company will build 4500 tons of approaches, and the Hill building at St. Paul, 8000 tons, taken by the Cambria Steel Company. In general the building situation is slow in developing.

The Chicago & Northwestern has made an addition to its recent rail order. The Kansas City Southern has bought 5000 tons and the St. Louis Terminal Railway, 6000 tons. In the 40,000 tons of orders accumulated for the starting up of the Sparrows Point rail mill this week was one for 12,000 tons from the Atlantic Coast Line.

The wire trade in March has not held up to the February rate, weather conditions being against consumption and distribution.

Rumors of low prices on bars from Belgian and German mills, for delivery at Eastern ports, are coupled with reports of sales at several dollars a ton below a 1.20c. Pittsburgh basis. It is known that some Eastern manufacturers have made purchases abroad, but details are lacking and the total thus far is probably less than 2000 tons.

In some Northern pig iron markets there is the contradiction of decreasing demand and a firmer attitude on prices by a number of sellers. Foundries have quite well covered their requirements for the first half; on the other hand furnaces have so much profitless business booked that they are unwilling to add more of the same kind. The increase in pig iron production is all on the steel end. No evidence appears of a net increase in foundry iron consumption.

The Lake ore firms at Cleveland, though receiving occasional inquiries about prices for 1914, prefer to see the steel trade improve, if it will, before doing business for next year. There are indications that more ore than the market can take is likely to be offered.

A Comparison of Prices

Advances Over the Previous Week in Heavy Type, Declines in Italics

At date, one week, one month, and one year previous				
	1914.	1914.	1914.	1913.
Pig Iron, Per Gross Ton:				
No. 2 X, Philadelphia...	\$15.00	\$15.00	\$15.00	\$17.80
No. 2, Valley furnace...	13.25	13.25	13.25	17.00
No. 2 Southern, Cin'tl...	14.00	14.00	13.75	16.25
No. 2, Birmingham, Ala.	10.75	10.75	10.50	13.00
No. 2, furnace, Chicago*	14.25	14.25	13.75	17.25
Basic, d'rd, eastern f'a...	14.00	14.50	14.00	17.75
Basic, Valley furnace...	13.00	13.00	13.25	16.10
Bessemer, Pittsburgh...	15.15	15.15	15.15	18.15
Malleable Bess., Ch'go*	14.25	14.25	13.75	17.25
Gray forge, Pittsburgh...	13.65	13.65	13.65	16.90
L. S. charcoal, Chicago...	15.25	15.25	15.25	18.00
Billets, etc., Per Gross Ton:				
Bess. billets, Pittsburgh...	21.00	21.00	21.00	28.50
O.-h. billets, Pittsburgh...	21.00	21.00	21.00	29.00
O.-h. sheet bars, P'gh...	22.00	22.00	22.00	29.50
Forging billets, base, P'gh.	25.00	25.00	25.00	36.00
O.-h. billets, Phila.	23.40	23.40	22.40	32.00
Wire rods, Pittsburgh...	26.50	26.50	26.50	30.00
Old Material, Per Gross Ton:				
Iron rails, Chicago.	12.75	13.00	13.00	16.25
Iron rails, Philadelphia...	16.50	16.50	16.50	18.00
Carwheels, Chicago.	11.75	12.25	12.75	16.75
Carwheels, Philadelphia...	12.75	12.75	12.50	15.00
Heavy steel scrap, P'gh.	12.25	12.25	12.75	14.25
Heavy steel scrap, Phila.	11.50	11.50	11.00	12.50
Heavy steel scrap, Ch'go.	9.75	10.00	11.00	12.00
No. 1 cast, Pittsburgh...	11.50	11.75	12.00	14.25
No. 1 cast, Philadelphia...	13.00	13.00	13.00	14.00
No. 1 cast, Ch'go (net ton)	10.50	10.50	11.25	12.50

*The average switching charge for delivery to foundries in the Chicago district is 50c. per ton.

Finished Iron and Steel,

Per Lb. to Large Buyers:	Cents.	Cents.	Cents.	Cents.
Bess. rails, heavy, at mill	1.25	1.25	1.25	1.25
Iron bars, Philadelphia...	1.25	1.27 1/2	1.25	1.67 1/2
Iron bars, Pittsburgh...	1.40	1.40	1.40	1.70
Iron bars, Chicago.	1.15	1.12 1/2	1.12 1/2	1.57 1/2
Steel bars, Pittsburgh...	1.20	1.20	1.20	1.85
Steel bars, New York...	1.36	1.36	1.36	2.01
Tank plates, Pittsburgh...	1.20	1.20	1.20	1.70
Tank plates, New York...	1.36	1.36	1.36	1.76
Beam, etc., Pittsburgh...	1.20	1.20	1.20	1.70
Beams, etc., New York...	1.36	1.36	1.36	1.86
Skelp, grooved steel, P'gh	1.20	1.25	1.25	1.45
Skelp, sheared steel, P'gh	1.25	1.35	1.35	1.50
Steel hoops, Pittsburgh...	1.30	1.30	1.30	1.60

Sheets, Nails and Wire,

Per Lb. to Large Buyers:	Cents.	Cents.	Cents.	Cents.
Sheet, black, No. 28, P'gh	1.95	1.95	1.95	2.35
Galv. sheets, No. 28, P'gh	2.95	2.95	2.95	3.50
Wire nails, Pittsburgh...	1.60	1.60	1.60	1.75
Cut nails, Pittsburgh...	1.65	1.65	1.60	1.70
Fence wire, base, P'gh...	1.40	1.40	1.40	1.55
Barb wire, galv., P'gh...	2.00	2.00	2.00	2.15

Coke, Connellsville,

Per Net Ton at Oven:	Mar. 11, 1914.	Mar. 4, 1914.	Feb. 11, 1914.	Mar. 12, 1913.
Purina coke, prompt....	\$2.00	\$1.85	\$1.85	\$2.40
Purina coke, future....	2.00	2.00	2.00	2.50
Foundry coke, prompt....	2.50	2.50	2.50	3.00
Foundry coke, future....	2.75	2.75	2.75	3.00

Metals.

Per Lb. to Large Buyers:	Cents.	Cents.	Cents.	Cents.
Lake copper, New York	14.75	15.00	15.00	15.12 1/2
Electrolytic copper, N. Y.	14.25	14.37 1/2	14.70	15.00
Spelter, St. Louis.....	5.15	5.15	5.30	6.25
Spelter, New York.....	5.30	5.30	5.45	6.40
Lead, St. Louis.....	3.90	3.87 1/2	4.05	4.20
Lead, New York.....	4.00	4.00	4.15	4.35
Tin, New York.....	38.12 1/2	37.90	41.00	46.60
Antimony, Hallett's, N. Y.	6.50	7.00	7.00	8.50
Tin plate, 100-lb. box, P'gh.	\$3.30	\$3.30	\$3.30	\$3.60

Finished Iron and Steel f. o. b. Pittsburgh

Freight rates from Pittsburgh, in carloads, per 100 lb.; New York, 16c.; Philadelphia, 15c.; Boston, 18c.; Buffalo, 11c.; Cleveland, 10c.; Cincinnati, 15c.; Indianapolis, 17c.; Chicago, 18c.; St. Louis, 22 1/2c.; Kansas City, 42 1/2c.; Omaha, 42 1/2c.; St. Paul, 32c.; Denver, 84 1/2c.; New Orleans, 30c.; Birmingham, Ala., 45c.; Pacific coast, 80c. on plates, structural shapes and sheets No. 11 and heavier; 85c. on sheets Nos. 12 to 16; 95c. on sheets No. 16 and lighter; 65c. on wrought pipe and boiler tubes.

Plates.—Tank plates, 1/4 in. thick, 6 1/4 in. up to 100 in. wide, 1.20c. to 1.25c. base, net cash, 30 days. Following are stipulations prescribed by manufacturers with extras:

Rectangular plates, tank steel or conforming to manufacturer's standard specifications for structural steel dated February 6, 1903, or equivalent, 1/4 in. and over on thinnest edge, 100 in. wide and under, down to but not including 6 in. wide, are base.

Plates up to 72 in. wide, inclusive, ordered 10.2 lb. per sq. ft., are considered 1/4-in. plates. Plates over 72 in. wide must be ordered 1/4 in. thick on edge, or not less than 11 lb. per sq. ft., to take base price. Plates over 72 in. wide ordered less than 11 lb. per sq. ft. down to the weight of 3-16 in. take the price of 3-16 in.

Allowable overweight, whether plates are ordered to gauge or weight, to be governed by the standard specifications of the Association of American Steel Manufacturers.

Extras

Cents per lb.

Gauges under 1/4 in. to and including 3-16 in....	.10
Gauges under 3-16 in. to and including No. 8.....	.15
Gauges under No. 8 to and including No. 9.....	.25
Gauges under No. 9 to and including No. 10.....	.30
Gauges under No. 10 to and including No. 12.....	.40
Sketches (including straight taper plates) 3 ft. and over.....	.10
Complete circles 3 ft. in diameter and over.....	.20
Boiler and flange steel.....	.10
"A. B. M. A." and ordinary firebox steel.....	.20
Still bottom steel.....	.30
Marine steel.....	.40
Locomotive firebox steel.....	.50
Widths over 100 in. up to 110 in., inclusive.....	.05
Widths over 110 in. up to 115 in., inclusive.....	.10
Widths over 115 in. up to 120 in., inclusive.....	.15
Widths over 120 in. up to 125 in., inclusive.....	.25
Widths over 125 in. up to 130 in., inclusive.....	.50
Widths over 130 in.....	1.00
Cutting to lengths, under 3 ft., to 2 ft. inclusive.....	.25
Cutting to lengths, under 2 ft., to 1 ft. inclusive.....	.50
Cutting to lengths, under 1 ft.....	1.55
No charge for cutting rectangular plates to lengths 3 ft. and over.	

Structural Material.—I-beams, 3 to 15 in.; channels, 3 to 15 in.; angles, 3 to 6 in. on one or both legs, 1/4 in. thick and over, and zees, 3 in. and over, 1.20c. to 1.25c. Extras on other shapes and sizes are as follows:

Cents per lb.

I-beams over 15 in.....	.10
H-beams over 18 in.....	.10
Angles over 6 in. on one or both legs.....	.10
Angles, 3 in. on one or both legs, less than 1/4 in. thick as per steel bar card, Sept. 1, 1909.....	.70
Tees, structural sizes (except elevator, hand rail, car truck and conductor rail).....	.05
Channel and tees, under 3 in. wide, as per steel bar card, Sept. 1, 1909.....	.20 to .80
Deck beams and bulb angles.....	.30
Hand rail tees.....	.75
Cutting to lengths, under 3 ft. to 2 ft. inclusive.....	.25
Cutting to lengths, under 2 ft. to 1 ft. inclusive.....	.50
Cutting to lengths, under 1 ft.....	1.55
No charge for cutting to lengths 3 ft. and over.	

Wire Products.—Fence wire Nos. 0 to 9 per 100 lb., terms 60 days or 2 per cent. discount in 10 days. Carload lots to jobbers, annealed, \$1.40; galvanized, \$1.80. Galvanized barb wire and fence staples to jobbers, \$2; painted \$1.60. Wire nails to jobbers, \$1.60. Prices of the foregoing wire products to dealers in carload lots are 5c. higher. Woven wire fencing, 73 1/4 per cent. off list for carloads; 72 1/2 off for 1000-rod lots; 71 1/2 off for less than 1000-rod lots.

The following table gives the price to retail merchants on fence wire in less than carloads, with the extras added to the base price:

Plain Wire, per 100 lb.

Nos.	0 to 9	10	11	12	13	14	15	16
Annealed	\$1.60	\$1.65	\$1.70	\$1.75	\$1.85	\$1.95	\$2.05	\$2.15
Galvanized	2.05	2.05	2.10	2.15	2.25	2.35	2.75	2.85

Wire Rods.—Bessemer, open-hearth and chain rods, \$26.50 to \$27.

Wrought Pipe.—The following are the jobbers' carload discounts on the Pittsburgh basing card on steel pipe in effect from February 2, 1914, and iron pipe from June 2, 1913, all full weight:

Steel.		Butt Weld		Iron.	
Inches.	Black.	Galv.	Inches.	Black.	Galv.
1 1/8, 1 1/4 and 3/8	72 1/2	52	1 1/4 and 1 1/2	66	47
1 1/2	76 1/2	66	1 1/2	65	46
1 3/4 to 3	79 1/2	71	1 3/4 to 2 1/2	69	56
				72	61

Lap Weld

2	76 1/2	68	1 1/4	56	45
2 1/2 to 6	78 1/2	70	1 1/2	67	56
7 to 12	75 1/2	65	2	68	58
13 to 15	52 1/2	..	2 1/2 to 4	70	61
			4 1/2 to 6	70	61
			7 to 12	68	55

Reamed and Drifted

1 to 3, butt....	77 1/2	69	1 to 1 1/2, butt....	70	59
2, lap	74 1/2	66	2, butt	70	59
2 1/2 to 6, lap....	76 1/2	68	1 1/4, lap	54	43
			1 1/2, lap	65	54
			2, lap	66	56
			2 1/2 to 4, lap....	68	59

Butt Weld, extra strong, plain ends

1 1/8, 1 1/4 and 3/8	67 1/2	57	3/8	53	52
1 1/2	72 1/2	66	1/2	67	60
1 3/4 to 1 1/2	76 1/2	70	3/4 to 1 1/2	71	62
2 to 3	77 1/2	71	2 and 2 1/2	72	63

Lap Weld, extra strong, plain ends

2	73 1/2	65	1 1/2	65	59
2 1/2 to 4	75 1/2	67	2	66	58
4 1/2 to 6	74 1/2	66	2 1/2 to 4	70	61
7 to 8	67 1/2	57	4 1/2 to 6	69	60
9 to 12	62 1/2	52	7 and 8	63	53
			9 to 12	58	47

Butt Weld, double extra strong, plain ends

1 1/2	62 1/2	56	1 1/2	57	49
3/4 to 1 1/2	65 1/2	59	3/4 to 1 1/2	60	52
2 to 2 1/2	67 1/2	61	2 and 2 1/2	62	54

Lap Weld, double extra strong, plain ends

2	63 1/2	57	2	55	49
2 1/2 to 4	65 1/2	59	2 1/2 to 4	60	54
4 1/2 to 6	64 1/2	58	4 1/2 to 6	59	53
7 to 8	57 1/2	47	7 to 8	52	42

To the large jobbing trade an additional 5 and 2 1/2 per cent. is allowed over the above discounts.

The above discounts are subject to the usual variation in weight of 5 per cent. Prices for less than carloads are two (2) points lower basing (higher price) than the above discounts on black and three (3) points on galvanized.

Boiler Tubes.—Discounts to jobbers, in carloads, in effect from January 2, 1914, are as follows:

Lap Welded Steel		Standard Charcoal Iron	
1 1/4 and 2 in.....	61	1 1/2 in.....	45
2 1/4 in.....	58	1 3/4 and 2 in.....	49
2 1/2 and 2 3/4 in.....	64	2 1/4 in.....	45
3 and 3 1/4 in.....	69	2 1/2 to 2 3/4 in.....	54
3 1/2 and 4 1/2 in.....	71	3 and 3 1/4 in.....	57
5 and 6 in.....	64	3 1/2 to 4 1/2 in.....	60
7 to 13 in.....	61	5 and 6 in.....	49

Locomotive and steamship special charcoal grades bring higher prices.

2 1/2 in. and smaller, over 18 ft., 10 per cent. net extra.

2 3/4 in. and larger over 22 ft., 10 per cent. net extra.

Less than carloads will be sold at the delivered discounts for carloads, lowered by two points for lengths 22 ft. and under to destinations east of the Mississippi River; lengths over 22 ft., and all shipments going west of the Mississippi River must be sold f.o.b. mill at Pittsburgh basing discount, lowered by two points.

Sheets.—Makers' prices for mill shipment on sheets of U. S. Standard gauge, in carload and larger lots, on which jobbers charge the usual advance for small lots from store, are as follows. f.o.b. Pittsburgh, terms 30 days net or 2 per cent. cash discount in 10 days from date of invoice:

Blue Annealed Sheets

Nos.	3 to 8	9 to 10	11 and 12	13 and 14	15 and 16
	1.40 to 1.45	1.45 to 1.50	1.50 to 1.60	1.55 to 1.65	1.65 to 1.70

Box Annealed Sheets, Cold Rolled

Nos.	10 and 11	12	13 and 14	15 and 16	17 to 21	22 and 24	25 and 26	27	28	29	30
	1.60 to 1.65	1.60 to 1.65	1.65 to 1.70	1.70 to 1.75	1.75 to 1.80	1.80 to 1.85	1.85 to 1.90	1.90 to 1.95	1.95 to 2.00	2.00 to 2.05	2.10 to 2.15

Galvanized Sheets of Black Sheet Gauge

	Cents per lb.
Nos. 10 and 11.....	1.95 to 2.00
No. 12.....	2.05 to 2.10
Nos. 13 and 14.....	2.05 to 2.10
Nos. 15 and 16.....	2.20 to 2.25
Nos. 17 to 21.....	2.35 to 2.40
Nos. 22 and 24.....	2.50 to 2.55
Nos. 25 and 26.....	2.65 to 2.70
No. 27.....	2.80 to 2.85
No. 28.....	2.95 to 3.00
No. 29.....	3.10 to 3.15
No. 30.....	3.25 to 3.30

Pittsburgh

PITTSBURGH, PA., March 11, 1914.

The steel business is still marking time. The new demand for nearly all kinds of iron and steel products is now about as dull as it was in December, and that month was recognized as the duller of last year. The unfavorable weather has no doubt had an effect in restricting the demand for certain iron and steel products, but nevertheless the fact must be conceded that confidence in the future is lacking and consumers therefore are slow in making new engagements. There should be an increase in business when spring trade starts, but how much this increase will be or how long it will last is uncertain. Some in the trade now believe that no permanent improvement in the steel business will come until late in the year, giving as their reasons that the effect of the new currency law is to be determined and that the railroads will not be buyers of material until some decision is reached in the rate case. An interesting rumor is that the Interstate Commerce Commission has decided to allow the railroads to charge 5½c. per ton for spotting cars, but that no increase in freight rates will be granted.

Pig Iron.—There is not enough demand to establish prices, the local market being as quiet as it could possibly get. The Pittsburgh Steel Company is expected to blow in its idle furnace at Monessen shortly, and in that event may be a seller of basic iron in the open market. A sale is reported of 2000 tons of high-grade foundry iron for forward delivery at \$13.50, Valley furnace. Bessemer iron is nominally held at former quotations, but if any business was offering these prices might be shaded. In the absence of sales we make nominal quotations on pig iron as follows: Bessemer, \$14.25; basic, \$13; No. 2 foundry, \$13.25 to \$13.50; gray forge, \$12.75 to \$13; maleable Bessemer, \$13.50 to \$13.75 for delivery through first half of this year, all at Valley furnace, the freight rate to the Pittsburgh or Cleveland district being 90c. a ton.

Billets and Sheet Bars.—New inquiry is dull, and one or two cases are reported where consumers have asked the steel mills to hold up shipments owing to the falling off in business in finished material. Nearly all consumers are covered ahead. Prices are fairly steady. We quote Bessemer and open-hearth billets at \$21 and Bessemer and open-hearth sheet bars at \$22, f.o.b. makers' mills, Pittsburgh or Youngstown, for the rest of this quarter. We quote forging billets at \$25 on desirable specifications, embracing only one size, and up to and including 10 x 10 in., the regular extras being charged for larger sizes. On small orders forging billets are held at \$26. We quote axle billets at \$23 for desirable orders and \$24 for small orders.

Muck Bark.—In the absence of sales we quote best grades made from all pig iron at \$28 to \$28.50, delivered to consumers' mills in the Pittsburgh district.

Steel Rails.—The Cambria Steel Company has taken an order for 3000 tons of standard sections for the Great Northern. The Carnegie Steel Company reports small orders coming in well, but no large contracts. The demand for light rails is fair, but rerolling mills are quoting them at about \$2 a ton less than on rails rolled from billets and are getting a good share of the business being placed. We quote splice bars at 1.50c. and standard section rails at 1.25c. Light rails, rolled from billets, are quoted as follows: 25, 30, 35, 40 and 45 lb. sections, 1.25c.; 16 and 20 lb., 1.30c.; 12 and 14 lb., 1.35c., and 8 and 10 lb., 1.40c., all in carload lots, f.o.b. Pittsburgh.

Wire Rods.—A shortage in the supply is reported due to the fact that nearly all makers are using their entire output in their own wire mills. We quote Bessemer,

open-hearth and chain rods at \$26.50 to \$27, Pittsburgh.

Skelp.—The new demand is quiet, and prices are slightly lower. We quote grooved steel skelp, 1.20c. to 1.25c.; sheared steel skelp, 1.25c. to 1.30c.; grooved iron skelp, 1.60c. to 1.65c., and sheared iron skelp, 1.65c. to 1.70c., delivered to consumers' mills in the Pittsburgh district.

Iron and Steel Bars.—As most consumers are covered ahead for some time, the new demand for both iron and steel bars is quiet. Specifications against contracts are coming in quite freely. The demand for reinforcing bars is active. The Cambria Steel Company has just taken an order for 6000 tons. We quote steel bars for prompt shipment at 1.20c. to 1.25c., the latter price holding for delivery in second quarter, and iron bars at 1.40c., f.o.b. makers' mill, Pittsburgh. Extras for twisting reinforcing steel bars over the base price are as follows: ¾ in. and over, \$1; ½ to 11/16 in., \$1.50; under ½ in., \$2.50 per net ton. This is the schedule of extras in force by mills that roll steel bars from billets, but mills that roll bars from old rails do not adhere to these extras, and sometimes omit them entirely.

Plates.—The Southern is asking bids on 1000 box, 500 flat and 1500 steel hopper cars. It will likely buy 400 flat cars this week. The Denver & Rio Grande has an inquiry out for 500 50-ton gondola cars. The Western Steel Car & Foundry Company has taken an order for 150 ore cars for the Butte, Anaconda & Pacific. None of the plates for the Government colliers came to local mills, but the Carnegie Steel Company took about 200 tons of bulb angles for these boats. The new demand for plates is quiet, and all the mills are short of work. We quote ¼-in. and heavier plates at 1.20c. to 1.25c., but it is said that occasionally 1.15c. is done by a few mills on some sizes for attractive orders.

Ferroalloys.—The local market is dull, as nearly all consumers of ferromanganese and ferrosilicon are covered for some time ahead. English 80 per cent. ferromanganese is freely offered at \$38, Baltimore, the freight rate to Pittsburgh being \$2.16 per ton. We quote 50 per cent. ferrosilicon, in lots up to 100 tons, at \$73; over 100 tons to 600 tons, \$72; over 600 tons, \$71 delivered in the Pittsburgh district. We quote 10 per cent. ferrosilicon at \$20; 11 per cent., \$21, and 12 per cent., \$22, f.o.b. cars Jackson County, Ohio, or Ashland, Ky., furnaces. We quote 20 per cent. spiegeleisen at \$25 at furnace. We quote ferrotitanium at 8c. per lb. in carloads; 10c. in 2000-lb. lots and over, and 12½c. in less than 2000-lb. lots.

Structural Material.—A large amount of work came out in the past week. The Cambria Steel Company has taken 8000 tons for the Great Northern office building at St. Paul, this being one of the largest contracts placed in this district for some time, and the same company has taken 7000 tons of structural shapes and 6000 tons of reinforcing steel bars for a prominent Western interest, which will build several new plants in various parts of the country. The Virginia Bridge & Iron Company has taken the approaches to the Memphis Railroad bridge, and the Cambria Steel Company will furnish the structural steel, about 6000 tons, the superstructure having been placed with the Pennsylvania Steel Company. The Cambria Steel Company has also booked various small orders for structural shapes, aggregating 6000 to 7000 tons. The Riter-Conley Mfg. Company has taken 850 tons for new steel buildings for the General Electric Company at Erie, Pa. The Pittsburgh Bridge & Iron Works has taken 500 tons for a new 10-story bank and office building for the Union Deposit Company, Steubenville, Ohio. The report that the McClintic-Marshall Company has taken a bridge over the Mahoning River at Lowellville, Ohio, is untrue. Local work in the market includes a city bridge, 1100 to 1200 tons; the telephone building on Grant Street, 3000 to 3500 tons, and a warehouse for the H. J. Heinz Company, 2000 to 3000 tons. A good deal of highway bridge work for the State of Ohio is in the market, and is expected to come out before long. Local steel fabricators are looking forward to a good year, believing that building operations will be active. We quote beams and channels up to 15 in. at 1.20c. to 1.25c., f.o.b. Pittsburgh.

Sheets.—The leading feature of the trade is that some orders are coming from the railroads. One local interest received an order last week for 1400 tons, and another took an order for 1000 tons for another road. Most leading makers are not willing to sell for delivery beyond April. The American Sheet & Tin Plate Company is understood to be confining its orders to March, and has not yet announced its prices on sheets for second quarter. The new demand is only fair, as consumers are covered for this month and April, but it is claimed that few sheets have been sold for delivery beyond next month. Mills report specifications active, one leading interest stating that its specifications last week were very heavy. Prices are fairly firm. A few mills are willing to sell No. 28 black sheets at 2c. and No. 28 galvanized at 3c. for second quarter delivery. The trade is still expecting an advance in prices of sheets for second quarter. For March delivery we quote No. 28 Bessemer black sheets at 1.95c. to 2c.; No. 28 galvanized, 2.95c. to 3c.; Nos. 9 and 10 blue annealed sheets, 1.45c.; No. 28 tin mill black plate, H. R. and A., 1.90c. to 1.95c.; Nos. 29 and 30, 1.95c. to 2c. These prices are f.o.b. Pittsburgh, in carload and larger lots, jobbers charging the usual advances for small lots from store.

Tin Plate.—There is practically no new buying, as consumers are covered and the mills report specifications very active. The outlook is that the consumption of tin plate this year will be the heaviest in any year in the history of the trade. The American Sheet & Tin Plate Company is operating to about 93½ per cent. of its hot tin mill capacity, and other leading makers are running their plants from 90 to 100 per cent. of capacity. On the very small amount of business being placed, we quote 100-lb. cokes at \$3.30 to \$3.40, and 100-lb. turners at \$3.20 to \$3.30, per base box, f.o.b. Pittsburgh.

Wire Products.—The new demand continues quiet, as jobbers and consumers are pretty well covered, but the makers report that specifications against contracts are active and shipments are heavy. A leading wire maker reports that it has at present actual specifications on its books to take its entire output of wire nails and wire over the next three months. Makers of woven wire fencing have lowered discounts (raised prices) one-half point. Prices on cut nails have been put at \$1.65 in carload lots, f.o.b. Pittsburgh, and it is stated that all the mills are holding this price. We quote: Wire nails, \$1.60; plain annealed wire, \$1.40; galvanized barb wire and fence staples, \$2; painted barb wire, \$1.60, all per 100 lb., f.o.b. Pittsburgh, with actual freight charge to point of delivery, terms being 30 days net less 2 per cent. off for cash in 10 days. We quote cut nails at \$1.65, f.o.b. Pittsburgh. Discounts on woven wire fencing are 73½ per cent. off in carload lots, 72½ per cent. off on 1000-rod lots and 71½ per cent. on less than 1000-rod lots, all f.o.b. Pittsburgh.

Hoops and Bands.—The new demand is quiet as most consumers are well covered. Makers report specifications coming in quite freely. We quote steel bands at 1.20c. to 1.25c., with extras as per the steel bar card, and steel hoops 1.30c., f.o.b. Pittsburgh.

Shafting.—Nearly all the larger consumers of shafting are covered up to July. Makers report specifications against contracts, especially from the automobile trade, as quite active. The implement trade is not specifying as freely as desired. We quote cold-rolled shafting in carload and larger lots at 63 to 64 per cent. and in small lots from 60 to 62 per cent. off delivered in base territory, depending on the order.

Spikes.—No large inquiries are in the market for standard sizes, but the demand for small spikes has been active lately, and the makers are pretty well filled for the next month or two. The spike trade is in much better condition as regards orders on the books than it was some time ago, and prices are firmer. We quote standard sizes of railroad spikes at \$1.45 to \$1.50 and small railroad and boat spikes at \$1.55 to \$1.60, per 100 lb., f.o.b. Pittsburgh.

Merchant Steel.—New orders are only fair, as most consumers covered ahead some time ago. The mills report specifications as fairly active. Prices are reported

firm. We quote: Iron finished tire, ½ x 1½ in. and larger, 1.35c., base; under ½ x 1½ in., 1.50c.; planished tire, 1.55c.; channel tire, ¾ to 1 in., 1.85c. to 1.95c.; 1½ in. and larger, 1.95c.; toe calk, 1.95c. to 2.05c., base; flat sleigh shoe, 1.70c.; concave and convex, 1.75c.; cutter shoe, tapered or bent, 2.25c. to 2.35c.; spring steel, 1.95c. to 2.05c.; machinery steel, smooth finish, 1.80c. We quote cold-rolled strip steel as follows: Base rates for 1 in. and 1½ in. and wider, under 0.20 carbon, and No. 10 and heavier, hard temper, 3.25c.; soft, 3.50c.; coils, hard, 3.15c.; soft, 3.40c.; freight allowed. The usual differentials apply for lighter sizes.

Nuts, Bolts and Rivets.—The nut and bolt market is inactive, as consumers are covered for some time ahead. Makers report specifications fairly active. The new demand for rivets is quiet, especially for boiler rivets, as boiler shops have been running very light for some time. Prices are fairly strong. We quote button-head structural rivets at \$1.65 to \$1.70 and cone-head boiler rivets at \$1.75 to \$1.80, in carload lots, an advance of \$2 to \$3 a ton over these prices being charged for small lots, depending on the order. Terms are 30 days net, less 2 per cent. for cash in 10 days. Discounts on nuts and bolts are as follows in lots of 300 lb. or over, delivered within a 20c. freight radius of makers' works:

Coach and lag screws.....	80 and 5% off
Small carriage bolts, cut threads.....	80% off
Small carriage bolts, rolled threads.....	80 and 5% off
Large carriage bolts.....	75 and 5% off
Small machine bolts, cut threads.....	80 and 5% off
Small machine bolts, rolled threads.....	80 and 10% off
Large machine bolts.....	75 and 10% off
Machine bolts, c.p.c. & t nuts, small.....	80% off
Machine bolts, c.p.c. & t nuts, large.....	75 and 5% off
Square h.p. nuts, blanked and tapped.....	\$6.30 off list
Hexagon nuts.....	\$7.20 off list
C.p.c. and r sq. nuts, blanked and tapped.....	\$6.00 off list
Hexagon nuts, ¾ and larger.....	\$7.20 off list
Hexagon nuts, smaller than 9/16.....	\$7.20 off list
C.P. plain square nuts.....	\$7.80 off list
C.P. plain hexagon nuts.....	\$5.50 off list
Semi-fin. hex. nuts, ¾ and larger.....	85 and 5% off
Semi-fin. hex. nuts, smaller than 9/16.....	85, 10 & 10% off
Rivets, 7/16 x 6 ½, smaller & shorter.....	80, 10 & 5% off
Rivets, metallic tinned, bulk.....	80, 10 and 5% off
Rivets, tin plated, bulk.....	80, 10 and 5% off
Rivets, metallic tinned, packages.....	80, 10 and 5% off
Standard cap screws.....	70, 10 and 10% off
Standard set screws.....	75, 10 and 10% off

Standard Pipe.—The demand for both iron and steel pipe is quiet, no doubt due in part to the heavy snows and cold weather. The country districts are pretty well tied up, and outside work has practically stopped. While stocks of pipe held by jobbers are low, they are not disposed at present to increase them. No large gas or oil lines are in the market, as it is too early in the year to take these up. The demand for oil-well supplies is fairly active, but in some sections new drilling has stopped on account of bad weather. Discounts on iron and steel pipe are reported as being fairly well held.

Coke.—A Sharpsville furnace interest is reported to have placed a contract with the Producers' Coke Company, Uniontown, Pa., for 5000 to 6000 tons of standard furnace coke per month for four months commencing March at \$2 per net ton at oven, and the same company has also sold 7000 to 8000 tons of furnace coke for March only to an Eastern furnace interest at \$2. It is understood that a Youngstown furnace interest has exercised an option it held on about 15,000 tons of coke per month for all of this year at \$2. The price of standard furnace coke is firm at \$2 at oven, but some grades are offered as low as \$1.85. The Frick Coke Company has recently blown in upward of 2000 ovens in the Connells-ville region to meet the increased demand made on it for blast furnace coke by Steel Corporation interests. The demand for foundry coke is quiet, but prices are firm. We quote strictly standard furnace coke for prompt shipment and for delivery up to and including June at \$2 per net ton at oven. We quote 72-hr. foundry coke from \$2.40 up to \$2.75 per net ton at oven, depending on the quality. The output of Connells-ville coke for the week ended February 28 was 313,870 net tons, according to the Connells-ville Courier, an increase over the previous week of over 10,000 tons.

Boiler Tubes.—The tube trade is in very unsatisfactory condition, the demand for both locomotive and merchant tubes being dull. Discounts on both iron and steel tubes are more or less shaded.

Old Material.—The only trading being done is between dealers, who are covering their short sales. Consumers bought pretty heavily a month or six weeks ago when the rise in the market took place, and are covered for some time ahead. One leading local consumer is reported to have named \$12 as the maximum price it will pay for heavy steel scrap, of which it is a large consumer. Steel mills making low-phosphorus melting stock are inclined to hold it, and this has resulted in the price of this material being better maintained than other grades of scrap. We have no sales of moment to note, as consumers are not buying. Dealers quote as follows, per gross ton, for delivery to consumers' mills in the Pittsburgh and nearby districts:

Selected heavy steel scrap, Steuben-	
ville, Follansbee, Brackenridge,	
Sharon, Monessen, Midland and	
Pittsburgh delivery	\$12.25 to \$12.50
Compressed side and end sheet scrap	11.25 to 11.50
No. 1 foundry cast	11.50 to 11.75
No. 2 foundry cast	10.25 to 10.50
Bundled sheet scrap, f.o.b. consumers'	
mills, Pittsburgh district	8.75 to 9.00
Rerolling rails, Newark and Cam-	
bridge, Ohio, Cumberland, Md., and	
Franklin, Pa.	13.50 to 13.75
No. 1 railroad malleable stock	11.00 to 11.25
Grate bars	8.00 to 8.25
Low phosphorus melting stock	15.25 to 15.50
Iron car axles	23.00 to 23.50
Steel car axles	16.75 to 17.00
Locomotive axles, steel	20.00 to 20.50
Locomotive axles, iron	25.00 to 25.50
No. 1 busheling scrap	10.75 to 11.00
No. 2 busheling scrap	7.25 to 7.50
Machine shop turnings	8.25 to 8.50
Old car wheels	11.25 to 11.50
Cast-iron borings	8.50 to 8.75
†Sheet bar crop ends	12.50 to 12.75
Old iron rails	14.00 to 14.25
No. 1 railroad wrought scrap	12.50 to 12.75
Heavy steel axle turnings	9.25 to 9.50
Stove plate	7.50 to 7.75
Heavy breakable cast scrap	12.00 to 12.25

†Shipping point.

Chicago

CHICAGO, ILL., March 11, 1914.—(By Wire.)

Each week seems to add fresh occasion for unsettled confidence. Our railroads, as a class, are frankly under suspicion, and their plea for support is losing weight in the popular mind. Our implement manufacturers are forced unwillingly to acknowledge conditions generally unfavorable and in several prominent instances absolutely unsound. These troubles, of which the end appears to recede as investigation proceeds, are influencing the business man in smaller matters of nearer consequence to the conspicuous detriment of everyday business. Structural shapes alone are prominent in the new business of the week, the award of contracts for the Memphis bridge and the Tri-Party building at St. Paul covering a total of nearly 30,000 tons. For the present the mills are doing very well on shapes and merchant bars and the sheet mills are increasing their consumption of semi-finished steel. But the mills are not accumulating a back-log of orders and are finding themselves unable to maintain the full advance to which prices were recently raised. A miscellaneous number of cars and locomotives have been placed, but not in quantity sufficient to make an impression on the situation. Pig-iron melters find the development of new business disappointing, and practically no gains have been made in releasing tonnage, the shipment of which began to be held up in the last quarter of the year. Furnaces report a very light inquiry. Little trading and declining prices characterize the scrap market.

Pig Iron.—New inquiries are few in number and of limited tonnage. The furnace problem is more likely to be a question of securing shipping instructions for the iron now under contract than of putting additional business on the books for the first half. Prices both for Northern and Southern iron remain unchanged, and in the absence of especially desirable inquiry the strength of these quotations is hardly tested. Sales are reported at \$10.75, Birmingham, for Southern No. 2, and \$14.25, f.o.b. furnace, for local iron. The following quotations are for iron delivered at consumers' yards, except those for Northern foundry, malleable Bessemer and basic iron, which are f.o.b. furnace and do not include a local switching charge averaging 50c. a ton:

Lake Superior charcoal, Nos. 1, 2, 3, 4	\$15.25 to \$15.75
Northern coke foundry, No. 1	14.75 to 15.00
Northern coke foundry, No. 2	14.25 to 14.75
Northern coke foundry, No. 3	14.00 to 14.25
Southern coke, No. 1 f'dry and 1 soft	15.60 to 16.10
Southern coke, No. 2 f'dry and 2 soft	15.10 to 15.60
Southern coke, No. 3	14.60 to 15.10
Southern coke, No. 4	14.10 to 14.60
Southern gray forge	13.85 to 14.35
Southern mottled	13.35 to 13.85
Malleable Bessemer	14.25 to 14.50
Standard Bessemer	16.50
Basic	13.50 to 14.00
Jackson Co. and Kentucky silvery, 6 per cent.	16.90
Jackson Co. and Kentucky silvery, 8 per cent.	17.90
Jackson Co. and Kentucky silvery, 10 per cent.	18.90

(By Mail)

Rails and Track Supplies.—The mills of the leading interest have benefited but little from rail specifications or from new contracts. Railroad buying is not expanding. Street railroads are likewise slow in specifying against contracts for girder rails and special track work. There is little or no business offering in spikes, bolts or tie plates, but quotations, when asked, reflect the desire of the mills for business. We quote standard railroad spikes at 1.50c. to 1.55c., base; track bolts with square nuts, 2c. to 2.10c., base, all in carload lots, Chicago; tie plates, \$26 to \$28 net ton; standard section Bessemer rails, Chicago, 1.25c., base; open hearth, 1.34c.; light rails, 25 to 45 lb., 1.25c.; 16 to 20 lb., 1.30c.; 12 lb., 1.35c.; 8 lb., 1.40c.; angle bars, 1.50c., Chicago.

Structural Material.—Some satisfaction is obtainable from the placing of structural tonnage for fabrication. An aggregate of more than 30,000 tons was awarded here. For the Mississippi River bridge of the Arkansas & Memphis Railway Bridge & Terminal Company, the Virginia Bridge & Iron Company will furnish the steel for approaches, amounting to 4500 tons and the Pennsylvania Steel Company the superstructure steel, totaling about 17,000 tons. This latter tonnage may be increased for heavier loading and the steel to be used will be made from Mayari ore. The Tri-Party Building at St. Paul, previously spoken of as the Hill building, will take 8000 tons, Cambria Steel Company furnishing the steel, fabricated. The 750 tons of structural shapes for the Federal League grand stand at Chicago will be fabricated by the American Bridge Company, delivery to be made in two weeks. Other contracts awarded include the Lincoln Theater, Spokane, 387 tons, to the Minneapolis Steel & Machinery Company; Classics Building, University of Chicago, 297 tons, to the South Halsted Street Iron Works; John F. Jelke Company factory, 555 tons, to Holmes, Pyott & Co.; Roger Colt Hotel, Oakland, Cal., 100 tons, to the Central Iron Works; Hyman office building, San Francisco, 250 tons, to the Western Iron Works; Nicola Capurro office building at San Francisco, 100 tons, to the Pacific Structural Iron Works; the St. Louis Frog & Switch Company foundry, 302 tons, to the Kenwood Bridge Company. Other miscellaneous contracts for a few hundred tons are also reported. Structural shapes alone, of the finished steel products, are quotable for ordinary business at the top figures to which the market has advanced. Some of the prices that have been made for fabricated steel throw some doubt upon the stability of plain shape quotations, based on 1.25c., Pittsburgh. Inasmuch as the mills furnishing the steel for the largest contracts placed last week will also fabricate the material, the price at which the plain material was figured in cannot be reported. We quote plain shapes, from mill, Chicago delivery, 1.38c. to 1.43c.

An increase in number and tonnage of orders is reported by local jobbers. We quote for delivery of structural shapes from store, 1.75c.

Plates.—Although there was recorded a nominal advance in quotations for plates, to the basis of 1.20c., Pittsburgh, and at this price a fair proportion of recent business was done, it is more apparent that quotations \$1 a ton lower did not entirely disappear. The higher quotation is applicable to less tonnage now than when the advance was first made. A miscellaneous tonnage in plates has been placed, but the aggregate is of no great importance. For Chicago delivery, from mill, we quote 1.33c. to 1.38c.

For Chicago delivery of plates, out of store, we quote, 1.75c.

Sheets.—Contract tonnage in sheets has been liberal and, in the instance of the mills at Indiana Harbor, sufficient to cover the rolling capacity through the first half. Specifications are holding up well thus far, the Gary plant of the leading interest even increasing its production. But indications are that all sheet mills are not faring equally well with the result that concessions of \$1 a ton are common on black and galvanized sheets. Except for the heavy gauges, quotations on blue annealed sheets seem more regular. We quote for Chicago delivery from mill; No. 10 blue annealed, 1.95c.; No. 28 black, 2.45c. to 2.55c.; No. 28 galvanized, 3.50c. to 3.60c.

For sheets out of store we quote for Chicago delivery as follows, minimum prices applying on bundles of 25 or more: No. 10 blue annealed, 1.95c.; No. 28 black, 2.45c. to 2.55c.; No. 28 galvanized, 3.50c. to 3.60c.

Bars.—The situation is more encouraging as regards merchant bars. Despite the inactivity in the two largest avenues of consumption, the wide and varied uses for steel bars have supplied sufficient tonnage to make the bar mills comfortable for at least the immediate present. Prices, however, show the absence of abundant tonnage and the maximum quotation is subject to shading where desirable specifications are involved. Bar-iron tonnage shows an increase of about 20 per cent. over the business of January and early February, and prices have an upward trend. Irregularities in quotations on shafting, while perhaps no more extreme, are more common. We quote for mill shipments as follows: Bar iron, 1.15c. to 1.17½c.; soft steel bars, 1.38c.; hard steel bars, 1.30c.; shafting in carloads, 65 per cent. off; less than carloads, 60 per cent. off.

Out of store, shafting may be had at prices on a parity with less than carload quotations from mill. We quote store prices for Chicago delivery: Soft steel bars, 1.65c.; bar iron, 1.65c.; reinforcing bars, 1.65c. base, with 5c. extra for twisting in sizes ½ in. and over and usual card extras for smaller sizes; shafting 60 per cent. off.

Hoops and Bands.—The volume of business developing in hoops and bands is not all that might be desired. The mills would welcome further contracting and heavier specifications, and are not standing too firmly upon the question of price, when business may be secured. We continue to quote for bands, 1.20c., Pittsburgh, with full standard classification extras, and for hoops, 1.30c., Pittsburgh.

Rivets and Bolts.—Specifications for bolts run into but small tonnages and cover too wide a range of sizes to be highly desirable. The carriage trade is buying in desultory fashion. The demand for rivets should improve very shortly, but is still at a minimum. We quote from mill as follows: Carriage bolts up to ¾ x 6 in., rolled thread, 80-5; cut thread, 80; larger sizes, 75-5; machine bolts up to ¾ x 4 in., rolled thread, 80-10; cut thread, 80-5; larger sizes, 75-10; coach screws, 80-15; hot pressed nuts, square head, \$6.20 off per cwt.; hexagon, \$7 off per cwt. Structural rivets, ½ to 1½ in., 1.73c. to 1.78c., base, Chicago, in carload lots; boiler rivets, 10c. additional.

We quote out of store: Structural rivets, 2.40c.; boiler rivets, 2.60c.; machine bolts up to ¾ x 4 in., 75-10; larger sizes, 70-10-5; carriage bolts up to ¾ x 6 in., 75-5; larger sizes, 70-10 off; hot pressed nuts, square head, \$6.00, and hexagon, \$6.70 off per cwt.

Wire Products.—The demand for steel in billets and rod form, for the wire mills, reflects their operation at a nearly normal rate. With the approach of March and April, the period of greatest shipments during the year, even heavier manufacturing schedules may be expected. We quote to jobbers as follows: Plain wire No. 9 and coarser, base, \$1.58; wire nails, \$1.78; painted barb wire, \$1.78; galvanized, \$2.18; polished staples, \$1.78; galvanized, \$2.13, all Chicago.

Cast-Iron Pipe.—Contracts awarded last week include 600 tons at Hibbing, Minn., 3000 tons at Akron, Ohio, 350 tons at Ft. Wayne, Ind., and an aggregate of about 2500 tons of gas pipe. Bids are to be received at Estivan, Alberta, Can., on 3700 tons of pipe and at Council Bluffs, Iowa, on 500 tons. Prices have been shaded and we have revised our quotations. We quote as follows, per net ton, Chicago: Water pipe, 4 in., \$26; 6 to 12 in., \$24; 16 in. and up, \$23.50, with \$1 extra for gas pipe.

Old Material.—Scrap coming into the market and under necessity of being moved makes up the greater part of the tonnage going into consumers' hands. Such trading is naturally conducive to a shading of the open market quotations and for some grades has established lower accepted values. The demand for steel-making scrap is heavier than for rolling-mill grades and prices for No. 2 railroad wrought are sustained in a measure by the diverting of this grade for consumption as shoveling steel. New offerings of railroad scrap total only 6000 tons. Of this the Santa Fe, whose accumulation of scrap is understood to have been greatly reduced, is offering 4500 tons; the Chicago Great Western 750 tons, and the Chicago, St. Paul, Minneapolis & Omaha, 800 tons. We quote, for delivery at buyers' works, Chicago and vicinity, all freight and transfer charges paid, as follows:

Per Gross Ton	
Old iron rails	\$12.75 to \$13.25
Old steel rails, rerolling	11.50 to 12.00
Old steel rails, less than 3 ft.	11:00 to 11.50
Relaying rails, standard section, subject to inspection	24.00
Old carwheels	11.75 to 12.25
Heavy melting steel scrap	9.75 to 10.25
Frogs, switches and guards, cut apart	9.75 to 10.25
Shoveling steel	9.25 to 9.75
Steel axle turnings	7.25 to 7.75

Per Net Ton	
Iron angles and splice bars	\$12.50 to \$13.00
Iron arch bars and transoms	12.50 to 13.00
Steel angle bars	9.25 to 9.75
Iron car axles	17.75 to 18.25
Steel car axles	12.75 to 13.25
No. 1 railroad wrought	9.25 to 9.75
No. 2 railroad wrought	8.75 to 9.00
Cut forge	8.75 to 9.00
Steel knuckles and couplers	9.25 to 9.75
Steel springs	10.00 to 10.50
Locomotive tires, smooth	10.25 to 10.75
Machine shop turnings	5.00 to 5.50
Cast borings	4.75 to 5.25
No. 1 busheling	7.75 to 8.25
No. 2 busheling	6.50 to 7.00
No. 1 boilers, cut to sheets and rings	6.50 to 7.00
Boiler punchings	9.25 to 9.75
No. 1 cast scrap	10.50 to 11.00
Stove plate and light cast scrap	9.50 to 10.00
Grate bars	9.50 to 10.00
Railroad malleable	9.75 to 10.25
Agricultural malleable	8.75 to 9.25
Pipes and flues	7.00 to 7.50

Philadelphia

PHILADELPHIA, PA., March 10, 1914.

Heavy snow badly hampered operations of local iron and steel plants last week. Operations have, however, been on a more normal basis since the opening of the week. The general movement in the iron and steel trade has been quieter. Pig-iron sales have been lighter, but prices are stronger. The bulk of the business has been in small lots. In finished materials the demand has been fair. Few makers are willing to sell for delivery beyond the first half of the year. Efforts to obtain higher prices are still being made in some lines, but without any uniform success. Billet sales are light. A heavier movement in furnace coke for second-quarter delivery is noted. The old material market continues quiet.

Iron Ore.—While there has been little of importance in new business, reports of a sale of 25,000 tons of African ore for this year's delivery are noted. Importations in the week ended March 7 included 5500 tons of Cuban and 7445 tons of Swedish ore.

Pig Iron.—The movement has been along narrower lines. The bulk of the sales in the higher grades of foundry iron have been in small lots, usually for early delivery. Prices, however, are generally firmer and in but few instances is the \$15 delivered price for standard brands of No. 2 X eastern Pennsylvania foundry available. Moderate sales for early delivery are made at \$15.10 to \$15.15 delivered and a number of producers are holding firmly at \$15.25, while small lots have been sold at \$15.50. Less desirable brands are occasionally available at slightly under \$15. The most important sales recently have been to cast-iron pipe foundries. Delaware River pipe makers have been negotiating for approximately 20,000 tons, some of which is for extended delivery. A sale of 3000 tons of Northern low-grade iron has been made to one consumer, while 400 tons of Southern low grade was made to another. An upper Delaware River pipe maker is also

reported to have purchased several thousand tons. Prices of low-grade iron appear to be firm at around \$14 delivered. Conflicting reports as to the extent of importations of Nova Scotia pig iron are heard. It is stated that no immediate further importations are likely, while on the other hand reports are to the effect that more will be brought. Much will depend upon the success met with in the importation of the iron already sold. New inquiry for the higher foundry grades has been lighter; several fair-sized inquiries, running up to 1000 tons, are still under negotiation, contracts for which are expected to be closed this week. Few inquiries for extended delivery have come out and makers generally are refusing to make quotations for shipments extending beyond July 1. Virginia foundry irons have been quieter. Sales have usually been in small lots for early delivery at unchanged prices, No. 2 X and lower grades being held at \$12.75 at furnace. Occasional sales at \$13 are made on small prompt lots. Rolling-mill forge remains quiet. Reports of further sales against uncompleted negotiations for basic iron are heard, the most important transaction having been a quiet purchase of 4000 tons for March shipment at \$14 delivered, involving a low freight rate, by an Eastern melter. Sellers report no further basic inquiries. Small sales of standard analysis low-phosphorous iron have been made at \$21 delivered here. Producers, notwithstanding the lighter demand, which was anticipated in view of the recent heavy movement in all grades, are holding prices more firmly. Present selling prices closely approach cost lines, and the disposition appears to be to await developments in the hope of better prices later on. The majority of the makers are pretty well covered for their near future output. Orders on the books on March 1 showed an increase over those of a month ago and stocks remain comparatively unchanged. The following range of prices about represents the market for near future delivery in buyers' yards in this district:

Eastern Penna. No. 2 X foundry.....	\$15.00 to \$15.25
Eastern Penna. No. 2 plain.....	14.75 to 15.00
Virginia No. 2 X foundry.....	15.55 to 15.80
Virginia No. 2 plain.....	15.55 to 15.80
Gray forge	14.00
Basic	14.00 to 14.25
Standard low phosphorus.....	21.00

Ferroalloys.—The demand for ferromanganese is confined to small prompt lots. Large consumers are pretty well covered for almost the remainder of the year. Small sales continue to be made at \$38, seaboard, for German, and \$39 for English 80 per cent. Ferro-silicon has been in light demand, with 50 per cent. quoted nominally at \$71 to \$73, delivered here, while furnace ferrosilicon is quoted at \$24.30 here for 11 per cent. grade.

Billets.—Business has been confined to small lots, usually for early delivery. Few inquiries of any size have developed. Mills continue to operate at an even basis, but largely on specifications against contracts, which have been coming out quite freely. Quotations are being well maintained, although not tested by any heavy inquiry. Basic open-hearth rolling billets are held at \$23.40 to \$24.40, delivered here, dependent on quantity. Forging steel commands an advance of \$4 to \$5 a ton over rolling billets, according to specification.

Plates.—Some Eastern mills continue to book very satisfactory orders, while others have not been so fortunate. A large part of the business has been in miscellaneous lots for early delivery, but some makers have entered moderate second-quarter contracts, usually at 1.40c., delivered. Current business is generally taken at 1.35c. Inquiries are before the trade for several round lots of tank plates, including one of 1000 tons. Steel for two Government boats, aggregating 8400 tons, will be contracted for at an early date.

Structural Material.—Business has been somewhat ragged. Large consumers are slow in coming into the market. Reports are to the effect that prospective railroad buying will be lighter than anticipated. Some small bridge work has been placed with local fabricators. It is stated that competition has developed in connection with the steel for the Widener Building, some 9000 tons, which was expected to go to the lead-

ing interest and that the contract has not yet been placed. While some mills in the East are operating on a fair basis, the average is said not to be over 60 per cent. of capacity. Plain shapes are generally quoted at 1.35c. here, but this price has not been seriously tested by any heavy demand.

Bars.—New business as well as mill operations has been seriously interfered with by unfavorable weather conditions. Sales have been comparatively light, and mills which are as a rule not booked very far ahead feel the loss of current business. In instances price inducements have been offered, down to 1.25c. here, being named for ordinary bars, although 1.27½c. to 1.32½c. is generally quoted. Steel bars have been in lighter demand, with prices unchanged.

Sheets.—The demand has been usually for small lots, but in the aggregate sufficient to keep mills operating at a fairly even basis. Efforts are being made to get No. 10 blue annealed sheets up to a minimum of 1.60c. delivered here, but 1.55c. can still be done.

Coke.—Some of the pending business in furnace coke for second-quarter delivery has been closed. One sale of 18,000 tons at \$2 at oven has been made and reports are to the effect that another transaction of about the same quantity and at the same figure was closed. Furnace coke for forward delivery is firm at \$2, although slightly under that price can be done for some brands for prompt shipment. Foundry coke has been quiet at \$2.50 to \$2.80 at oven. For delivery in buyers' yards in this district the following range of prices is named:

Connellsville furnace coke.....	\$3.90 to \$4.15
Connellsville foundry coke.....	4.65 to 4.95
Mountain furnace coke.....	3.55 to 3.75
Mountain foundry coke.....	4.45 to 4.75

Old Material.—The market has been extremely quiet. Weather conditions have largely interrupted the movement of old material. Transactions in practically all grades have been confined to small lots and prices of some are weaker. Railroad offerings this month have been comparatively light. Mills offer \$11 to \$11.50 for No. 1 heavy melting steel, but get little if any material. Borings and turnings are weaker. Little demand has come out for rolling-mill grades. Buyers and sellers are playing a waiting game. The following quotations about represent the market for deliveries in buyers' yards in this district, covering eastern Pennsylvania and taking freight rates varying from 35c. to \$1.35 per gross ton:

No. 1 heavy melting steel.....	\$11.50 to \$12.00
Old steel rails, rerolling.....	13.50 to 14.00
Low phosphorus heavy melting steel	
scrap (nominal)	14.50 to 15.00
Old steel axles (nominal).....	16.50 to 17.00
Old iron axles.....	23.00 to 24.00
Old iron rails.....	16.50 to 17.00
Old carwheels.....	12.75 to 13.00
No. 1 railroad wrought.....	14.00 to 14.50
Wrought pipe	10.75 to 11.25
No. 1	10.00 to 10.50
Bundle	10.00 to 10.50
No. 2 lig. iron (nominal).....	5.00
No. 2 busheling.....	8.50 to 9.00
Wrought turnings.....	9.00 to 9.25
Cast borings.....	9.00 to 9.25
Machinery cast	13.00 to 13.50
Grate bars, railroad.....	9.50 to 10.00
Stove plate	10.00 to 10.50
Railroad malleable	10.00 to 10.50

Cleveland

CLEVELAND, OHIO, March 10, 1914.

Iron Ore.—That furnace men are beginning to show some interest in the ore market is indicated by the fact that ore firms are receiving some inquiries regarding 1914 prices. It is believed that the inquiries are prompted more by curiosity than by any serious intention of buying in the near future. Sellers are still holding off in the hope that general business conditions will improve so that they will be able to get better prices than they would if the business outlook continues unfavorable. Dock shipments continue light. We quote 1913 prices as follows: Old range Bessemer, \$4.40; Mesaba Bessemer, \$4.15; old range non-Bessemer, \$3.50; Mesaba non-Bessemer, \$3.40.

Pig Iron.—The market is extremely dull. The only sales reported are some small lots of foundry grades, which consumers need to fill in. Conditions in the foundry trade show a little improvement, but most consumers have under contract all the iron they will need for the first half. There is an occasional inquiry for last half iron, but furnaces either decline to quote for that delivery or ask an advance in prices, which consumers are unwilling to pay. No inquiry of any size has come out since the recent advance in prices, so that the higher quotations have not yet been tested. Cleveland furnaces are so far adhering firmly to \$14 at furnace for No. 2 foundry, and small lot sales have been made at this price. Southern iron is holding at \$10.75 to \$11 for No. 2. A few small lot sales are reported for early delivery. Consumers think that prices may possibly go lower and are buying only for their early requirements. We quote f.o.b. Cleveland as follows:

Bessemer	\$15.15
Basic	14.00
Northern No. 2 foundry	14.25
Southern No. 2 foundry	\$15.10 to 15.35
Gray forge	13.50
Jackson Co. silvery, 8 per cent. silicon	17.55

Coke.—The market is dull. A few small lot sales of foundry coke for early shipment are reported. Standard grades of furnace coke are held at \$2 per net ton for early shipment. We quote foundry coke at \$2.50 to \$2.75.

Finished Iron and Steel.—New demand is very light, being only for small lots, and specifications are coming out only in moderate volume. Many consumers are still well supplied with material as a result of the liberal orders accompanied by specifications placed in January and have not since come into the market. Weather conditions will shortly permit the opening of outside work and this is expected to cause a moderate improvement in the demand. In spite of the dullness prices are being well maintained. Quotations on steel bars, plates and structural material are 1.20c. to 1.25c. While most mills are adhering to the former price for steel bars, this price probably can still be shaded \$1 a ton on a desirable order for reinforcing purposes. The demand for structural material is light, little new building work being figured on. The only new inquiry is for 500 tons for the Kresge and O'Neil Building in Akron. The demand for iron bars continues dull and both local mills are partially shut down. We quote iron bars at 1.20c. to 1.25c. at mill. New demand for sheets is not active and prices are unchanged at 1.90c. for No. 28 black, 2.90c. for No. 28 galvanized and 1.45c. for No. 10 blue annealed. Buyers can make contracts at these prices for delivery until May 1 and possibly longer. Warehouse business is not active. We quote stock prices at 1.80c. for steel bars and 1.90c. for plates and structural material.

Old Material.—The market is dull and weak. Prices on several grades have declined 25c. to \$1 a ton. Dealers appear anxious to unload stocks and the bulk of transactions are between dealers. Two local mills have shut off on shipments and one Cleveland plant expects to be out of the market for thirty days. We quote f.o.b. Cleveland as follows:

Per Gross Ton	
Old steel rails, rerolling	\$12.00 to \$12.50
Old iron rails	13.50 to 14.00
Steel car axles	15.00 to 15.25
Heavy melting steel	10.50 to 11.25
Old carwheels	11.50 to 12.00
Relaying rails, 50 lb. and over	23.00 to 25.00
Agricultural malleable	9.00 to 9.50
Railroad malleable	10.75 to 11.25
Light bundled sheet scrap	7.00 to 7.50

Per Net Ton	
Iron car axles	\$20.00 to \$21.00
Cast borings	6.50 to 6.75
Iron and steel turnings and drillings	5.75 to 6.25
Steel axle turnings	7.00 to 7.50
No. 1 busheling, new	9.00 to 9.50
No. 1 busheling, old	8.25 to 8.50
No. 1 railroad wrought	10.50 to 11.00
No. 1 cast	10.75 to 11.00
Stove plate	8.75 to 9.00

Bolts and Rivets.—Some price cutting on bolts and nuts is being done by jobbers who have low priced contracts that expire April 1. Rivet specifications are good and prices unchanged at 1.65c. for structural and 1.75c. for boiler round lots. We quote mill discounts as

follows: Common carriage bolts, $\frac{3}{8}$ x 6 in. smaller or shorter, rolled thread, 80 and 5 per cent.; cut thread, 80 per cent.; larger or longer, 75 and 5 per cent.; machine bolts with h.p. nuts, $\frac{3}{8}$ x 4 in., smaller or shorter, rolled thread, 80 and 10 per cent.; cut thread, 80 and 5 per cent.; larger or longer, 75 and 10 per cent.; coach and lag screws, 80 and 15 per cent.; square h.p. nuts, blank or tapped, \$6.30 off; hexagon h.p. nuts, blank or tapped, \$7.20 off; c. p. c. and t. square nuts, blank or tapped, \$6 off; hexagon, $\frac{5}{8}$ in. and larger, \$7.20 off; 9/16-in. and smaller, \$7.80 off; semi-finished hexagon nuts, $\frac{5}{8}$ in. and larger, 85, 10 and 5 per cent.; 9/16 in. and smaller, 85, 10, 10 and 5 per cent.

Cincinnati

CINCINNATI, OHIO, March 11, 1914.—(By Wire.)

Pig Iron.—The inquiry has dwindled to the low-water mark. The only open business concerns a southern Indiana melter, who is willing to purchase from 1000 to 3000 tons of Northern foundry for shipment over the remainder of the year, but so far has been unable to obtain satisfactory quotations. Little prompt shipment carload business is being booked, but specifications on contracts are fairly good. The Hanging Rock furnaces have taken a determined stand to get more for their iron. Most of them have booked heavily for the first half, and are thus able to assume a more aggressive attitude. The usual quotation today is \$13.50, Iron-ton, for any shipment up to July 1. The majority of producers are asking \$14 at furnace for last half. No sales have been recorded at either of these prices, which went into effect March 7. Southern iron is unchanged at \$10.75, Birmingham basis, for prompt shipment, although nearly all Alabama furnace interests are holding at \$11. While there is a hesitancy on the part of both Northern and Southern furnace men to make quotations on last half business, it is known that they are all in a receptive mood, and not averse to considering firm offers for that delivery. The engineers and firemen at the Jackson County silvery furnaces are on a strike, and two furnaces there are now banked. There is no demand for malleable. Based on freight rates of \$3.25 from Birmingham and \$1.20 from Iron-ton we quote, f.o.b. Cincinnati, as follows:

Southern coke, No. 1 f'dry and 1 soft	\$14.50 to \$15.00
Southern coke, No. 2 f'dry and 2 soft	14.00 to 14.50
Southern coke, No. 3 foundry	13.50 to 14.00
Southern, No. 4 foundry	13.00 to 13.50
Southern gray forge	12.50 to 13.00
Ohio silvery, 8 per cent. silicon	17.20 to 17.70
Southern Ohio coke, No. 1	15.70 to 16.20
Southern Ohio coke, No. 2	14.70 to 15.20
Southern Ohio coke, No. 3	14.45 to 14.70
Southern Ohio malleable Bessemer	14.70 to 15.20
Basic, Northern	14.70 to 15.20
Lake Superior charcoal	16.25 to 17.25
Standard Southern earwheel	27.25 to 27.75

(By Mail)

Coke.—The effects of the recent severe weather have not yet disappeared. Several furnaces in Ohio have suffered for the want of fuel and there has been a demand for prompt shipment coke that has tended to strengthen prices. Although this situation may be relieved before the week is over prompt shipment Connellsville furnace coke is bringing \$2.10 per net ton at oven, which is also the price asked by leading producers on contracts. The foundries have not suffered to any appreciable extent, as most of them had a sufficient supply to carry them through and they are not operating up to anything like normal. About 10c. a ton may be added to the above mentioned figure on Wise County and Pocahontas furnace coke. On foundry grades the three different fields are getting closer together. Standard 72-hr. coke is quoted around \$2.60 in the Connellsville district, although a few brands can be contracted for around \$2.50. Wise County and Pocahontas foundry grades range from \$2.60 to \$2.75 per net ton at oven.

Finished Material.—Local store business has been almost at a standstill the past few days, and it will be at least a week before any demand comes out for any class of material. The rolling mills are making shipments of sheets, and while there has been a natural hold-up, due to weather conditions, the demand from the South was probably about normal for the season. This has practi-

cally been the only section from which new orders have been received in the past two weeks. No. 28 black sheets are very firm at 2.15c. and galvanized sheets at 3.15c., f.o.b. cars Cincinnati or Newport, Ky. Store prices on steel bars are 1.75c. to 1.80c. and on small structural shapes 1.85c.

Old Material.—Prices continue to weaken on almost all grades. There is very little buying by the rolling mills, and the foundries also appear to be well supplied. The minimum figures given below represent what buyers are willing to pay for delivery in their yards, southern Ohio, and Cincinnati, and the maximum quotations are dealers' prices f.o.b. at yards:

Per Gross Ton	
Bundled sheet scrap	\$7.25 to \$7.75
Old iron rails	12.25 to 12.75
Relaying rails, 50 lb. and up.....	20.25 to 20.75
Re-rolling steel rails	11.25 to 11.75
Melting steel rails	9.75 to 10.25
Old carwheels	10.75 to 11.25
Per Net Ton	
No. 1 railroad wrought	\$9.25 to \$9.75
Cast borings	5.00 to 5.50
Steel turnings	5.00 to 5.75
No. 1 cast scrap	9.75 to 10.25
Burnt scrap	6.50 to 7.25
Old iron axles	17.25 to 17.75
Locomotive tires (smooth inside)....	10.25 to 10.75
Pipes and flues	6.75 to 7.25
Malleable and steel scrap	7.75 to 8.25
Railroad tank and sheet scrap	5.75 to 6.25

Birmingham

BIRMINGHAM, ALA., March 9, 1914.

Pig Iron.—The \$11 basis for Birmingham pig iron appears to be maintained, but there has been only a small amount of business recently. Southern consumers find no difficulty in filling their wants at this price, which is an indication that for large lots in Northern and Western territory a lower price would be quoted. Several makers are asking \$11.25 for second half. Whether this will be established remains to be seen, as but little business has been done for that period. Carload lots continue to bring \$11.25, and special analysis irons command a premium over the general quotation. There is a dearth of low grade iron and No. 2 soft is also difficult to secure. All over the field there is a notable improvement in furnace methods, resulting in the production of a diminished amount of gray forge and kindred grades. Small foundrymen continue to buy from hand to mouth. There is no apparent disposition to purchase for forward delivery. The few sales made in that direction have been by the interest demanding \$11.50 for the second half. Operations continue on about the same basis as in February and January. The foundry iron market is to an extent influenced by stocks on hand, those of one company alone being about 80,000 tons. On the other hand, one large interest reports very little stock and order books satisfactorily filled. It is still a question whether the higher prices asked will be maintained. This depends largely upon railroad buying and the consequent operations at foundries. We quote, per gross ton, f.o.b. cars, Birmingham, as follows:

No. 1 foundry and soft.....	\$11.25 to \$11.50
No. 2 foundry and soft.....	10.75 to 11.00
No. 3 foundry	10.25 to 10.50
No. 4 foundry	10.00 to 10.25
Gray forge	9.75 to 10.00
Basic	10.50 to 11.00
Charcoal	23.50 to 24.00

Cast-Iron Pipe.—A large manufacturer declares there is no standard price in the water and gas pipe trades. The plants are operating on full time, as a rule, but prices depend upon each trade. The American Cast Iron Pipe Company is changing its pits one by one to produce 16-ft. pipe. It has received a good order from Cuba. Sanitary pipe is going better than in several months, owing to the laying in of stocks for spring and replenishing old stocks. Prices are fairly well maintained. We quote, per net ton, f.o.b. pipe yards, nominal prices as follows: 4-in., \$22; 6-in. and upward, \$20.

Coal and Coke.—There has been a slight improvement in the coke market. A larger tonnage is mov-

ing, but general conditions are still far from satisfactory. We quote, per net ton, f.o.b. oven, as follows: Furnace coke, \$2.25 to \$2.65; foundry, \$3.25 to \$3.50. Small coal mines find it difficult to keep going and the lethargy in the trade existing for some time is still apparent.

Old Material.—There has been some activity in stove plate and other cast scrap has also moved liberally, but there has been a flat market in steel scrap. The general wrought-iron market has improved and transactions have been of a satisfactory volume in that line. We quote, per gross ton, f.o.b. dealers' yards, as follows:

Old iron axles	\$14.50 to \$15.00
Old steel axles	14.50 to 15.00
Old iron rails	13.00 to 13.50
No. 1 railroad wrought	10.00 to 11.00
No. 2 railroad wrought	8.50 to 9.00
No. 1 country wrought	9.00 to 10.00
No. 2 country wrought	8.00 to 9.00
No. 1 machinery cast	9.50 to 10.00
No. 1 steel scrap	8.00 to 8.50
Tram carwheels	9.50 to 10.00
Standard carwheels	10.50 to 11.00
Stove plate	8.00 to 8.50

St. Louis

ST. LOUIS, Mo., March 9, 1914.

Pig Iron.—Business closed was confined to small lots for immediate shipment or very early delivery. Only two inquiries of any consequence were left unfilled, one for 500 tons of charcoal carwheel iron and one for 500 tons of No. 2 Southern. Movement on allotments under contracts are reported steady with relatively little request for withholding shipments, and indeed a number of requests for anticipation of shipments. The stove industry, while working reasonably full, is reporting new business a little slow. Specialty foundries are for the most part working to full capacity, particularly the larger ones on the east side. Quotations are rather ragged, the range, according to different furnace representatives, being from \$10.50 to \$11.50 for No. 2 Southern, Birmingham basis. No business is being sought beyond the first half and no quotations are being made. No. 2 Chicago is firm at \$14.25 and No. 2 Northern at \$13.50, Iron-ton basis.

Coke.—One transaction is reported of about 4000 tons of foundry grade. The quotations being made here for best 72-hr. selected Connellsville are on a basis of \$2.60 to \$2.75 per net ton at oven, with Virginia figures for the same grade \$2.50 to \$2.85 for prompt to future delivery. For furnace grades, the quotation here is \$2 to \$2.10 for Connellsville and \$2.25 for Virginia prompt to future shipment.

Old Material.—The market has been dull and weaker, demand having fallen off materially in all directions. Relaying rails are the only bright spot, these holding firm at quotations and hard to get in sufficient quantities to fill orders. We quote dealers' prices, f.o.b. St. Louis, as follows:

Per Gross Ton	
Old iron rails	\$11.50 to \$12.00
Old steel rails, re-rolling.....	12.00 to 12.25
Old steel rails, less than 3 feet.....	10.50 to 11.00
Relaying rails, standard section, subject to inspection	23.00 to 24.00
Old carwheels	10.50 to 11.00
No. 1 railroad heavy melting steel scrap	10.50 to 11.00
Shoveling steel	9.00 to 9.50
Frogs, switches and guards cut apart	10.50 to 11.00
Bundled sheet scrap	4.50 to 5.00

Per Net Ton	
Iron fish plates.....	\$11.00 to \$11.50
Steel angle bars	9.25 to 9.75
Iron car axles	17.50 to 18.00
Steel car axles	12.50 to 13.00
Wrought arch bars and transoms.....	12.00 to 12.50
No. 1 railroad wrought.....	9.00 to 9.50
No. 2 railroad wrought.....	9.00 to 9.50
Railroad springs	9.00 to 9.50
Steel couplers and knuckles.....	9.00 to 9.50
Locomotive tires, 42 in. and over, smooth	10.00 to 10.50
No. 1 dealers' forge	8.00 to 8.50
Mixed borings	4.00 to 4.50
No. 1 busheling	8.00 to 8.50
No. 1 boilers, cut to sheets and rings	6.25 to 6.75
No. 1 cast scrap	10.50 to 11.00
Stove plate and light cast scrap....	8.50 to 9.00
Railroad malleable	8.25 to 8.75
Agricultural malleable	7.75 to 8.25
Pipes and flues	6.25 to 6.75
Railroad sheet and tank scrap.....	6.50 to 7.00
Railroad grate bars	7.50 to 8.00
Machine shop turnings	5.00 to 5.50

Finished Iron and Steel.—Structural material is being taken uninterruptedly by the fabricators, who see considerable amounts of work ahead, almost ready to come out. In standard steel rails one sale of 6000 tons was made to a Kansas line and one of about 1000 tons is pending with a road having local headquarters. Light rails are very dull. The coal interests, in preparation for a strike April 1, have determined on no more extensions for the present. Bars are in fair demand, particularly for reinforcing use, and the agricultural dealers are fairly active. Demands for quick shipment indicate that stocks are low. The only car order of moment for the week was one of 1000 for the Cotton Belt.

Buffalo

BUFFALO, N. Y., March 10, 1914.

Pig-iron.—A small volume of business was closed. Sales of all grades reached a total of about 7500 tons, with unfilled inquiry for between 7000 and 8000 tons. Unfavorable weather conditions and the delay in the freight rate decision have both been contributory causes to the lull in buying. Notwithstanding the lessened buying, prices have strengthened somewhat, and the minimum of price schedules have been advanced 25c. per ton by most producers over the figures quoted below, even off-grade iron now being held at \$13. For prompt and first half delivery we quote as follows, f.o.b. furnace:

No. 1 foundry	\$13.50 to \$14.00
No. 2 X foundry	13.25 to 13.75
No. 2 plain	13.00 to 13.25
No. 3 foundry	13.00 to 13.25
Gray forge	12.75 to 13.25
Malleable	13.25 to 13.75
Basic	13.50 to 14.00
Charcoal	15.75 to 16.75

Finished Iron and Steel.—Specifications on contracts are coming in at about the same ratio as for the past three weeks. New business, however, has been small in volume and inquiry rather light. A feeling of confidence exists that the near approach of Spring will stimulate new construction work, and that demand for finished materials will increase rather than lessen in consequence. Jobbers report that business is good, even compared with last year at this season, when ordering was at full tide. The City of Rochester is now taking bids on 41,000 ft. of 29-in. riveted steel pipe. Revised bids are being taken this week on 200 tons of structural steel for the printing house for the J. W. Clement Company, Buffalo. Bids went in to-day on 400 tons for the Institute for the Feeble Minded at Polk, Pa., and bids will soon be taken for 150 tons for a theatre for the East Avenue Amusement Company, Rochester; also for 100 tons for the Grant Theatre, Buffalo. A warehouse for the United Hardware Supply Company, Erie, Pa., will take 500 tons. The 900 tons of steel for the machine shop addition to the plant of the General Electric Company, Erie, went to the Ritter-Conley Mfg. Company, Pittsburgh.

Old Material.—Car wheels are in good demand and scarce. In most other lines the market shows symptoms of weakness, although tonnage demand remains fairly good. Prices for machine-shop-turnings dropped 75c. per ton. Large offerings were placed on the market by producers when prices were recently advanced, and the supply is now larger than the demand. Clean cast borings have also dropped 25c. We quote as follows, per gross ton, f.o.b. Buffalo:

Heavy melting steel	\$10.50 to \$11.00
Bundled sheet scrap	6.75 to 7.25
No. 1 busheling scrap	9.50 to 10.00
No. 2 busheling scrap	7.00 to 7.50
Low phosphorus steel scrap	15.50 to 16.25
Iron rails	15.00 to 15.50
No. 1 railroad wrought	12.00 to 12.50
No. 1 railroad and machinery cast	12.00 to 12.50
Old steel axles	17.00 to 17.50
Old iron axles	22.50 to 23.00
Old carwheels	12.00 to 12.50
Railroad malleable	10.75 to 11.25
Locomotive grate bars	9.50 to 10.00
Wrought pipe	8.50 to 9.00
Machine shop turnings	6.00 to 6.25
Heavy steel axle turnings	8.25 to 9.00
Clean cast borings	6.50 to 7.00
Stove plate (net ton)	9.75 to 10.00
Bundled tin scrap	12.00

Boston

BOSTON, MASS., March 10, 1914.

Old Material.—The market seems rather weak, consumers showing little interest, apparently waiting further developments. Prices have not changed. The quotations given below are based on prices offered by the large dealers to the producers and to the small dealers and collectors, per gross ton, carload lots, f.o.b. Boston and other New England points which take Boston rates from eastern Pennsylvania points. In comparison with Philadelphia prices the differential for freight of \$2.30 a ton is included. Mill prices are approximately 50c. a ton more than dealers' prices:

Heavy melting steel	\$8.75 to \$9.00
Low phosphorus steel	13.75 to 14.75
Old steel axles	13.25 to 13.75
Old iron axles	21.25 to 21.75
Mixed shafting	12.75 to 13.00
No. 1 wrought and soft steel	9.00 to 9.25
Skeleton (bundled)	6.00 to 6.50
Wrought-iron pipe	8.25 to 8.50
Cotton ties (bundled)	7.25 to 7.75
No. 2 light	3.75 to 4.25
Wrought turnings	5.50 to 6.00
Cast borings	5.75 to 6.25
Machinery, cast	11.25 to 11.50
Malleable	8.00 to 8.25
Stove plate	7.75 to 8.00
Grate bars	6.25 to 6.50
Cast-iron carwheels	11.00 to 11.25

New York

NEW YORK, March 11, 1914.

Pig Iron.—While the pressure of low-priced Buffalo iron noticed early in the year has not been on the Eastern market in recent weeks, there is still the like influence of the very considerable foundry iron output of one large eastern Pennsylvania producer. Most noteworthy among reported sales of the past week is a total of 1800 tons to a plumbing supply foundry in New Jersey, divided between iron 2 to 2.25 in silicon and iron 2.75 to 3.25 in silicon. With a freight of 80 cents from eastern Pennsylvania furnace the No. 2 plain iron in this transaction was sold at something under \$14.60, delivered. This would indicate that from the lowest prices of recent weeks the advance in sharp competition is about 25 cents a ton; that is, while \$13.75 at furnace was done earlier in the year on No. 2 X iron, close to that price has now been done on No. 2 plain. Some other sellers in eastern Pennsylvania are holding at \$14.50 at furnace for No. 2 X, or \$15.20 at tidewater. In New England, Buffalo, Virginia and eastern Pennsylvania irons are now more nearly on a parity than was the case in January and early February, making delivered prices there for No. 2 X iron, as now quoted on ordinary lots, between \$15.75 and \$16.25. The No. 2 iron from Nova Scotia recently sold in New England was reported to have brought about \$15 at water points. Sentiment in the market is less hopeful than was the case a fortnight ago. Severe winter weather at a time when the beginnings of spring are looked for has set back business actually and sentimentally. Inquiry for malleable grades has appeared in Connecticut, one company asking for 2000 to 4000 tons. Some charcoal iron has been sold in the past week, and the present Buffalo basis is \$15.75 to \$16. We quote Northern iron for tidewater delivery as follows: No. 1 foundry, \$15.25 to \$15.50; No. 2 X, \$14.75 to \$15.25; No. 2 plain, \$14.50 to \$14.75. Southern iron is on the basis of \$15.25 to \$15.75 for No. 1 and \$15 to \$15.25 for No. 2.

Finished Iron and Steel.—Considerable business in foreign bars has apparently been done at prices which figure around 1.15c. or 1.20c., New York, duty paid. A guarantee is made in respect to meeting the specified requirements of the purchaser. Specifications on contracts with American mills continue at a high rate, though perhaps not so active as a week or ten days ago, but new inquiries are not brisk. There is more evidence that jobbers and manufacturers are protected as regards their stocks against a possible sudden expansion in demand. Lettings in structural lines in this territory are at a low ebb, and railroad car buying is at bottom. One notably large award is 16,000 tons for a combined railroad and highway bridge at Memphis,

taken by the Pennsylvania Steel Company. Some of the contracts placed in the East embrace 450 tons for a loft on West Forty-fourth street, to Ravitch Brothers; 500 tons for a department store in New Rochelle, to the Hedden Iron Construction Company; 800 tons for a high school, Boston, to Levering & Garrigues Company; 500 tons for the First National Bank, Syracuse, to Ravitch Brothers; 250 tons for the Long Island Hospital, to the American Bridge Company; 225 tons for turbine foundations for the Interborough, to Milliken Brothers, and 100 tons for the Pennsylvania, to Lewis F. Shoemaker & Co. Among new projects under consideration may be named the Franklin Square House addition, Boston, 325 tons; a residence on East Seventieth street, 450 tons; a garage, Bangor, Me., 270 tons; the Bedell store, Pittsburgh, 300 tons, and a bank at Bridgeport on which bids are yet to be asked. In railroad cars the Standard Steel Car Company has taken 100 gondolas for the Lake Erie, Franklin & Clarion. While the Southern is expected shortly to close for some 2200 cars and the Pittsburgh Railways will early decide on its 225 traction cars, it is not thought that the New York Central will make very heavy purchases or that very much other new car business will develop until the freight rate question is definitely decided. The stability with which general prices for finished material are held is taken to indicate that not much business is to be obtained by angling with price concessions as a bait, and the quotations of last week are repeated as follows, with the notation that most of the new commitments in this territory go at the lower prices for the more desirable lots except in the case of bar iron, where the higher figure is the common one, with some of the mills getting an addition for small lots: Mill shipment for steel bars, plates and structural material for early shipment, 1.20c. to 1.25c., Pittsburgh, or 1.36c. to 1.41c., New York; iron bars, 1.30c. to 1.35c., New York. We quote iron and steel bars from store at 1.90c. to 1.95c., and shapes and plates, 1.95c. to 2c.

Ferroalloys.—Later and more authoritative estimates place the total tonnage of 80 per cent. ferromanganese sold on the large movement in January and February at close to 75,000 tons. It is, therefore, not surprising that both inquiries and sales are very few now. The small sales of small lots of the English brand that are being made are going at \$39 to \$40, seaboard. The German product is reported to be available at \$38, seaboard. The usual business is being done in 50 per cent. ferrosilicon at \$73, Pittsburgh, for carloads; \$72 for 100 tons and \$71 for 600 tons and over.

Cast-Iron Pipe.—The city of Rochester, N. Y., opens bids to-day on 8000 tons of 37-in. pipe, which is an unusual size. Private buying has improved considerably this week. Carload lots of 6-in. are unchanged at \$22 to \$23 per net ton, tidewater.

Old Material.—While recent transactions in heavy melting steel scrap in eastern Pennsylvania would appear to indicate some degree of stability in the market, the prices received by the Pennsylvania Railroad Company on offerings in its list for this month point to the contrary. It is stated that all prices it obtained were lower than on similar old material in last month's list, while on some articles the drop was quite heavy. Within the last two or three days the demand has shrunk for all classes of scrap and the trade is much less hopeful. Dealers' quotations are as follows, per gross ton, New York:

Old girder and T rails for melting....	\$8.75 to \$9.25
Heavy melting steel scrap.....	8.75 to 9.25
Relaying rails	21.50 to 22.00
Re-rolling rails	11.00 to 11.50
Iron car axles.....	19.50 to 20.00
Steel car axles.....	13.00 to 13.50
No. 1 railroad wrought.....	11.25 to 11.75
Wrought-iron track scrap.....	9.75 to 10.25
No. 1 yard wrought, long.....	9.25 to 9.75
No. 1 yard wrought, short.....	8.75 to 9.25
Light iron	3.50 to 4.00
Cast borings	6.00 to 6.50
Wrought turnings	6.00 to 6.50
Wrought pipe	8.50 to 9.00
Carwheels	12.00 to 12.50
No. 1 heavy cast, broken up.....	11.50 to 12.00
Stove plate	8.50 to 9.00
Locomotive grate bars.....	7.50 to 8.00
Malleable cast	8.00 to 8.50

British Markets are Listless

The Chief Feature of the British Iron Trade Is an Increase in the Output of Pig Iron

(By Cable)

LONDON, ENGLAND, March 11, 1914.

We are still experiencing listless, dragging markets, with no special feature except an increasing pig-iron output. There is just a chance of Russian buying of semi-finished steel assuming importance. The works there are congested with orders, and buyers are inquiring for large quantities here and in Germany, but business is unlikely without the temporary withdrawal of the Russian duty on steel. There is no general business coming up. Stocks of pig iron in Connaught's stores are 130,654 gross tons, against 133,082 tons a week ago. We quote as follows:

Tin plates, coke, 14 x 20, 112 sheets, 108 lb., f.o.b. Wales, 13s. 1½d. (\$3.19).

The following prices are per ton of 2240 lb.:

Cleveland pig-iron warrants (Tuesday), 50s. 5d. (\$12.26), against 50s. 4½d. (\$12.25) one week ago.

No. 3 Cleveland pig iron, makers' price, f.o.b. Middlebrough, 50s. 9d. (\$12.34).

Hematite pig iron, f.o.b. Tees, 62s. (\$15.09), against 62s. 3d. (\$15.14) one week ago.

Steel sheet bars (Welsh), delivered at works in Swansea Valley, £4 10s. (\$21.89).

Steel bars, export, f.o.b. Clyde, £6 (\$29.20).

Steel joists, 15-in., export, f.o.b. Hull or Grimsby, £5 17s. 6d. (\$28.59).

Steel ship plates, Scotch, delivered local yards, £5 17s. 6d. (\$33.46).

Steel black sheets, No. 28, export, f.o.b. Liverpool, £8 15s. (\$42.58), a decline of 5s. (\$1.22).

Steel rails, export, f.o.b. works port, £5 19s. (\$28.95).

The following prices are per export ton of 1015 kilos, equivalent to 2237.669 lb.:

German sheet bars, f.o.b. Antwerp, 81s. (\$19.70).

German 2-in. billets, f.o.b. Antwerp, 76s. (\$18.48).

German basic steel bars, f.o.b. Antwerp, £4 10s. (\$21.90).

German joists, f.o.b. Antwerp, £5 2s. to £5 5s. (\$24.82 to \$25.55).

Metal Market

NEW YORK, March 11, 1914.

The Week's Prices

Cents Per Pound for Early Delivery

Copper, New York		Lead		Spelter	
Mar.	Lake	Electro-lytic	Tin, New York	New York	St. Louis
5.....	14.75	14.25	37.90	4.00	3.87½
6.....	14.75	14.25	37.65	4.00	3.90
7.....	14.75	14.25	37.65	4.00	3.90
9.....	14.75	14.25	37.37½	4.00	3.90
10.....	14.75	14.25	37.75	4.00	3.90
11.....	14.75	14.25	38.12½	4.00	3.90

There has been some buying of copper by domestic consumers but prices are lower. Tin, after a declining tendency throughout most of the week, is stronger. In lead there has been a better demand and more strength has developed in the West. Spelter has a slightly better tone. Antimony shows a little weakness.

New York

Copper.—In the latter part of last week there was at least fair buying of electrolytic, but little was taken for export. This week the foreign demand has been good again. On the strength of the better business of last week, which was on a basis of 14.37½c., delivered, cash, 30 days, there was an effort made to send prices back to 14.50c., delivered, cash, 30 days, but the consumers would have none of it and quotations stayed at the lower level. The statement of the Copper Producers' Association, given elsewhere in this issue, had little direct effect on the domestic market. So far as Europe is concerned, it is believed that the other side has been more impressed with the new showing of small American consumption than with any other phase of the

report. While it is true that stocks decreased, the more important feature is that domestic deliveries in February were about 12,000,000 lb. less than in February a year ago, and the combined deliveries of January and February over 29,000,000 lb. less than those of the corresponding months in 1913. These figures probably are the cause of the decline shown in London quotations. Exports continue on a large scale, having reached a total this month of 13,712 tons. The heavy shipments are the cause of conjecture as to whether they are going into actual consumption or into stocks in consumers' yards. The copper business has been helped along in the past few days by the demand for copper wire needed to repair the heavy damage done to electric wires by the recent storm. Prime Lake copper is absolutely nominal for the reason that it cannot be had. Arsenical brands have been offered as low as 14.37½c., but they cannot be used in high grade brass work. The last sale of prime Lake was made at 15.12½c., and while the price will certainly be lower when buying is resumed the exact level cannot be foretold. Electrolytic is weak to-day at 14.25c., delivered, cash, New York. The London quotations to-day are £63 17s. 6d. for spot and £64 7s. 6d. for futures.

Tin.—There has been some business but at no time has activity been heavy. In the latter part of last week trade was still hindered by poor wire connections with interior points. On March 6, between 200 and 250 tons was traded in by dealers, but Saturday was quiet again. Monday was extremely dull, prices were cut and speculative holders tried to sell. Yesterday there was a change in sentiment and fair inquiry developed, mostly from consumers, but they wanted bargain lots at below the import cost. Sellers seemed to have a hint, however, that greater strength was growing in London and demanded the full import cost. To-day, London is up £1 10s. and strong. The New York quotation to-day, following the lead of London, is 38.12½c. The London quotations are £174 2s. 6d. for spot and £175 17s. 6d. for futures. Stocks are more than ample which accounts for prices in the week having descended to the level of London with nothing allowed for freight. Arrivals this month total 2906 tons and there is afloat 2132 tons.

Lead.—On Thursday, Friday and Saturday inquiry was better and a fair business followed, but since then the market has been quiet. The improved demand caused greater strength in the West. The export of lead actually mined and smelted in the United States continues, this movement being the first of the kind in many years. Under present conditions it is a certainty that prices will not go lower, especially in view of the fact that the London market is strong at £20. The New York quotation is unchanged at 4c., but in St. Louis 3.90c. is quoted.

Spelter.—The market has a slightly better tone, but quotations for prime Western are unchanged at 5.30c., New York, and 5.15c., St. Louis.

Antimony.—Dullness prevails, with prices slightly lower. For Hallett's 6.90c. to 7c. is quoted; for Cookson's 7.20c. to 7.25c., and for Chinese and Hungarian brands 5.90c. to 6.25c.

Old Metals.—The market is inactive and prices are lower. Dealers' selling prices are nominally as follows:

	Cents per lb.
Copper, heavy and crucible.....	13.75 to 14.00
Copper, heavy and wire.....	13.25 to 13.50
Copper, light and bottoms.....	12.75 to 13.00
Brass, heavy.....	9.00 to 9.25
Brass, light.....	7.75 to 8.00
Heavy machine composition.....	12.25 to 12.50
Clean brass turnings.....	8.75 to 9.00
Composition turnings.....	11.25 to 11.50
Lead, heavy.....	3.75
Lead, tea.....	3.50
Zinc, scrap.....	4.25

Chicago

MARCH 9.—The tin market has passed through a week of bearish influences without any quotable decline in price. Copper also occupies a position in which there is more of weakness than strength without change in value from previous quotations. The week was for the most part without feature. We quote as follows: Casting copper, 14.75c.; Lake copper, 15c., for prompt shipment; small lots, ¼c. to ½c. higher; pig tin, carloads,

39c.; small lots, 41c.; lead, desilverized, 4c., and corroding, 4.25c., for 50-ton lots; in carloads, 2½c. per 100 lb. higher; spelter, 5.30c.; Cookson's antimony, 9.50c.; other grades, 8c.; sheet zinc, \$7.25, f.o.b. La Salle or Peru, Ill., less 8 per cent. discount in carloads of 600-lb. casks. On old metals we quote buying prices for less than carload lots as follows: Copper wire, crucible shapes, 12c.; copper bottoms, 11c.; copper clips, 11.25c.; red brass, 11.25c.; yellow brass, 8.25c.; lead pipe, 3.50c.; zinc, 3.75c.; pewter, No. 1, 25c.; tinfoil, 29c.; block tin pipe, 32c.

St. Louis

MARCH 9.—Lead has been sensitive to purchases, showing a tendency to strengthen, with the last sale, 100 tons, at 3.90c. and that price refused on further lots. Spelter is quoted at 5.15c. to 5.17½c.; Lake copper, 14.62½c. to 14.85c.; electrolytic copper, 14.75c. to 14.95c.; tin, 37.75c. to 38.10c.; Cookson's antimony, 7.60c. In Joplin ore there was some increase in production with a natural tendency toward lower prices, and final quotations were \$38 to \$41 per ton for 60 per cent., with the top settlements reaching \$44; calamine, \$21 to \$22 for 40 per cent., with the best settlements at \$25; lead ore, \$50 for 80 per cent. We quote miscellaneous scrap metals as follows: Light brass, 5c.; heavy yellow brass, 7.50c.; heavy red brass and light copper, 9c.; heavy copper and copper wire, 10c.; pewter, 22c.; tinfoil, 29c.; zinc, 2.75c.; lead, 3c.; tea lead, 2.75c.

Iron and Industrial Stocks

NEW YORK, March 11, 1914.

The stock market was shaken to some extent by the Interstate Commerce Commission's criticism of the bookkeeping of the St. Paul Railroad, while the Mexican situation developed some additional unsettling influences. A few industrial stocks, such as the Westinghouse, made substantial gains. The range of prices on active iron and industrial stocks from Wednesday of last week to Tuesday of this week was as follows:

Allis-Chal., com..	12½-13½	Nat. En. & St.,	
Allis-Chal., pref.	47½-48½	pref.	86-86½
Am. Can., com...	28½-30½	Pittsburgh Stl., pref...	92
Am. Can., pref...	92½-93	Pressed Stl., com.	42½-43½
Am. Car & Fdy.,		Pressed Stl., pref.	103½-104
com.	49½-51½	Ry. Spring, com.	27½-28½
Am. Car & Fdy.,		Ry. Spring, pref.	95-98½
pref.	117½-118	Republic, com...	25-27
Am. Loco., com.	34-35½	Republic, pref...	89½-91
Am. Loco., pref...	102	Rumely Co., com.	13½-15
Am. Stl. Edries.	34-35	Rumely Co., pref.	30½-34
Bald. Loco., com.	49½-52½	Sloss, com.....	32-34
Bald. Loco., pref...	106½	Pipe, com.....	11-12½
Beth. Steel, com.	38½-43½	Pipe, pref.....	44
Beth. Steel, pref.	79½-83	U. S. Steel, com.	63-65½
Case (J. I.), pref.	84½-88½	U. S. Steel, pref.	109½-110½
Colorado Fuel...	31½-33½	Va. I. C. & Coke	51-52
Deere & Co., pref.	95-96½	West'gh's Elec.	70½-74½
General Elec....	146-148½	Chic. Pneu. Tool	58-58½
Gt. N. Ore Cert.	35½-37	Cambria Steel..	49½-50½
Int. Harv., com.	102½-105	Lake Sup. Corp.	21-22
Int. Harv., pref...	118½	Pa. Steel, pref...	65½-66
Int. Harv. Corp.	102½-105	Cruc. Steel, com.	16½-16¾
Int. Pump, com...	8	Cruc. Steel, pref.	94½-94¾
Lackawanna Steel...	38½	Harb.-Wk. Ref., com...	52
Nat. En. & St., com...	11½	Harb.-Wk. Ref., pref...	99

Dividends Declared

The International Harvester Company of New Jersey and International Harvester Corporation, regular quarterly, 1½ per cent. on the common stock, payable April 15.

The Western Electric Company, regular quarterly, 2 per cent. payable March 31.

The Continental Can Company, regular quarterly, 1½ per cent. on the preferred stock, payable April 1.

The American Can Company, regular quarterly, 1½ per cent. on the preferred stock, payable April 1.

The Cambria Iron Company, regular semi-annual, 2 per cent., payable April 1.

The Lanston Monotype Company, regular quarterly, 1½ per cent., payable March 31.

The Dominion Steel Corporation, usual dividend on the common stock, payable April 1, passed "in view of the depression in general trade conditions and in the steel trade in particular."

The Pittsburgh Tin Ware Mfg. Company, annual, 7 per cent., payable March 14.

Newark Foundrymen's Association

The Newark Foundrymen's Association, Newark, N. J., at its meeting held March 4, was addressed by Walt S. Goodwin, who styles himself an employee efficiency educator. The address dealt with the spirit of efficiency and largely involved business psychology. In contradistinction to those so-called efficiency experts who entirely overlook the human equation in scheming the machinery of production, Mr. Goodwin deals with the men exclusively. Some pointed criticisms which he directed at employers were taken in good nature and he was heartily applauded at the end of his address.

Mr. Goodwin said that too much attention could not be given to the selection of men in accordance with their ability to plan or execute and that the more a manager studied human nature the more he would like it. The great problem in efficiency engineering is in "swinging" the men and that without success in this direction plans for increasing production fall short of their purpose. The men must be studied as carefully as the product or the mechanical means for its production. The average factory foreman, instead of broadening out in the management of men, gets his "crowd" around him and grows narrower with an "I am boss—do as I say or get out" attitude. Good generalship and the increase of production by maneuvering the men were neglected. He believed one mistake which served to weaken the moral fiber of a plant was the policy of hiring only such men as might be easily handled, whereas the men with spirit and a mind of their own would accomplish more if tactfully used. When jealousy arose in the shop, Mr. Goodwin advised employers first to search themselves for the reason, inasmuch as they might be showing favoritism unconsciously, just as a father sometimes favors one of his children as the other children can feel. Among the things he deprecated was the case of the man who was trying to advance yet would not train an efficient understudy because he feared that he might lose his place. Such a man, he declared, is entirely outside the scheme of efficiency. Another point he made was that the giving of a proportionately equal advance in salary to all the employees of a shop was often a mistake. Though it might be founded on good-heartedness, it was not commendable for the reason that while many might deserve a 5 per cent. advance, others should get 10 per cent. and still others none at all. He expressed disapproval of the profit-sharing plan of the Ford Motor Company for the reason that while it was based on kindness it upset too many other considerations.

Prior to the address there was the usual dinner and business meeting. Fifty members and guests were present. Henry R. Worthington, Harrison, N. J., and Essex Foundry, Newark, N. J., were elected to membership. The association now has 46 members.

The New Fairfield Wire Plant

The new wire plant of the American Steel & Wire Company at Fairfield, Ala., has been in operation for the past two weeks and is now turning out wire and wire nails. The rod mill, in which to a Morgan continuous mill are joined features of the Belgian mill, has been operating quite satisfactorily. The new plant has been inspected by officers of the American Steel & Wire Company and will be visited next week by President Farrell of the Steel Corporation.

A Better Industrial Relations Exhibit will be held April 18 to 25, at 2 West Sixty-fourth street, New York City. It will show the devices in modern business which tend to make more harmonious the relations between employer and employee, and to better the conditions of employment. The Business Men's Group of the Society for Ethical Culture has charge of the exhibit, which will appeal to both employer and employee in the manufacturing trades. There will be special evening lectures by industrial leaders of the country. No admission will be charged. J. R. Rankin, 2 West Sixty-fourth street, will give further information if desired.

Foundrymen for Saloon Limitation

The Philadelphia Foundrymen's Association held its regular monthly meeting (the 236th) at the Hotel Walton in that city on the evening of March 4. The "Back with the Saloon" movement recently started by Thomas D. West, Cleveland, was discussed at length by W. H. Ridgway, of Craig Ridgway & Son Company, Coatesville, Pa., Howard Evans, and others. It was formally moved and adopted that the association go on record as favoring this movement and Secretary Evans was directed to prepare resolutions along the lines of those adopted by the Cleveland Foundrymen's Association, to be presented to State and county authorities in Pennsylvania. The resolutions as drafted by the secretary are as follows:

Whereas, The drinking of intoxicants by employees during working hours increases the number of accidents and is detrimental to the welfare and the safety of the employee and detracts from his rendering efficient service,

We, the foundrymen of Philadelphia and vicinity, in order to aid in the prevention of accidents and to minimize their number, hereby request the Legislature of our State to enact such laws as will instruct the liquor license judges of the State of Pennsylvania and all the respective counties in the State of Pennsylvania to refuse to issue a license for a saloon located within 600 ft. of any manufacturing plant or foundry.

We further resolve that a copy of this resolution be sent to the Governor of Pennsylvania and to the members of the State Legislature.

The Textile Machinery Company, Reading, Pa., and the Standard Cast Iron Pipe & Foundry Company, Bristol, Pa., were elected to membership in the association. After the transaction of routine business Prof. Robert H. Fernald, mechanical and electrical engineering department, University of Pennsylvania, Philadelphia, presented a paper on "The Smoke Nuisance," illustrated by numerous lantern slides.

Steel Corporation Bonds Redeemed at 110

The second drawing of United States Steel Corporation second 5 per cent. bonds, due in 1963, has been made by J. P. Morgan & Co., the sinking fund trustees, for redemption of bonds through the sinking fund on May 1 at 110. The amount of bonds to be redeemed at that time is \$1,501,000. The first redemption took place November 1, 1913, when \$293,000 bonds were called for payment at 110.

Hereafter, it is announced, the drawing will take place annually in February, and will increase in amount each year as the amount of interest received by the trustees on the bonds held in the sinking fund grows. The annual payment by the corporation to this sinking fund is \$1,010,000, but bonds which have previously been redeemed are held alive in the fund and the interest on them is applied for the redemption of additional bonds.

For the first 10 years of the life of the bonds the trustees were allowed to buy bonds for the sinking fund at the lowest price obtainable in the open market. About \$13,000,000 were so purchased and held alive in the fund. Beginning April 1, 1913, however, the indenture securing the bonds provided that the bonds had to be drawn by lot for the sinking fund and paid for at 110. It is in accordance with this provision that drawings will hereafter be made annually. The Wall Street Journal says that the normal operation of this cumulative sinking fund will redeem at 110 by 1950, or 13 years before maturity, all of the \$187,000,000 United States Steel Corporation second 5 per cent. bonds now outstanding.

The Linde Air Products Company, New York, said to be the largest producer of oxygen in the world, recently placed a large contract for seamless flasks or containers with the Harrisburg Pipe & Pipe Bending Company, Harrisburg, Pa. The flasks are drawn from solid steel plates by a hydraulic forging process under rigid specifications of the Linde Company, sample cylinders being tested to 6500 lb. per sq. in. without bursting, though the wall thickness is less than $\frac{1}{8}$ in. thick. Another interesting specification recently received by the Pipe Bending Company is for 100,000 pieces of steel to be converted into automobile wheel rims for a well-known car.

The Steel Corporation's \$150,000 Exhibit

The United States Steel Corporation is planning a very extensive exhibit of its various products at the Panama-Pacific Exposition at San Francisco next year. A large space has been taken in the Mines and Metallurgy building and an outlay of \$150,000 will be made for the exhibits as now planned. The welfare work of the Steel Corporation will have an important place and an unusually elaborate exhibit will be made of the Mesaba range and other Lake Superior iron mining operations, while all the products of the various subsidiary companies will be represented in unique ways.

Steel Corporation Orders Increase

The unfilled orders of the United States Steel Corporation on February 28, as reported on Tuesday, March 10, were 5,026,440 tons, against 4,613,680 tons on January 31, an increase of 412,760 tons. This is better than was generally expected. New business in the first half of February was not as good as in the first half. Below is given a statement of unfilled tonnage for each month, from December 31, 1910, and previous to that the amounts at the end of each year:

February 28, 1914..5,026,440	February 29, 1912..5,454,200
January 31, 1914..4,613,680	January 31, 1912..5,379,721
December 31, 1913..4,282,108	December 31, 1911..5,084,761
November 30, 1913..4,396,344	November 30, 1911..4,141,955
October 31, 1913..4,513,767	October 31, 1911..3,694,328
September 30, 1913..5,003,785	September 30, 1911..3,611,317
August 31, 1913..5,223,468	August 31, 1911..3,584,085
July 31, 1913..5,399,356	July 31, 1911..3,695,985
June 30, 1913..5,807,317	June 30, 1911..3,361,058
May 31, 1913..6,324,322	May 31, 1911..3,113,187
April 30, 1913..6,978,762	April 30, 1911..3,218,704
March 31, 1913..7,468,956	March 31, 1911..3,447,301
February 28, 1913..7,656,714	February 28, 1911..3,400,543
January 31, 1913..7,827,368	January 31, 1911..3,110,919
December 31, 1912..7,932,164	December 31, 1910..2,674,757
November 30, 1912..7,852,883	December 31, 1909..5,927,031
October 31, 1912..7,594,381	December 31, 1908..3,603,597
September 30, 1912..6,551,507	December 31, 1907..4,624,552
August 31, 1912..6,163,375	December 31, 1906..8,489,719
July 31, 1912..5,957,079	December 31, 1905..7,605,096
June 30, 1912..5,807,346	December 31, 1904..4,696,203
May 31, 1912..5,750,983	December 31, 1903..3,215,123
April 30, 1912..5,464,887	December 31, 1902..5,347,523
March 31, 1912..5,304,841	

Standard Screw Company's New Stock

Under the amended certificate of incorporation of the Standard Screw Company, which became legally effective February 19, the date of the annual meeting, the 6 per cent. cumulative preferred stock is now class A stock and the new 7 per cent. cumulative preferred stock authorized under the amendment becomes class B stock.

Class B stock to the amount of \$1,000,000 will be offered to holders of class A stock of record March 2, at par in the proportion of one share of the 7 per cent. stock to each holder of two shares of the old 6 per cent. stock. Subscription books close April 14. Any holder of record March 2 of class A shares, upon payment in full for shares of class B subscribed for, will be entitled on or before July 1 to convert shares of 6 per cent. class A owned by him into 7 per cent. class B stock on the basis of share for share, provided that the number of shares of class A so converted shall not exceed twice the number of class B shares so subscribed and paid for by such holder. All rights of conversion will expire July 1, 1914.

Swedish Vessels for Chilean Iron Ore

In *The Iron Age* of February 19 reference was made to contracts placed abroad by the Bethlehem Steel Company for the carrying of its Chilean iron ore to the United States. One of the contracts, which are for 20 years, appears to have gone to Sweden, the report being that the Broström Company, ship owners, of Gothenburg, will transport a portion of the ore to the United States, and that two steamers, with a capacity of 17,000 tons each, are to be employed in this traffic regularly.

Railway Steel Spring Company

The Railway Steel Spring Company has issued its report for the year ended December 31, 1913. The income account compares as follows with the previous year:

	1913	1912
Gross earnings	\$7,688,185	\$9,041,079
*Expenses	5,966,092	6,599,940
Depreciation	250,000	359,986
Net earnings	1,472,093	2,081,153
Interest	350,433	357,175
Surplus	1,121,660	1,723,978
Preferred dividend	945,000	945,000
Surplus	176,660	778,978
Previous surplus	4,618,543	3,839,565
Total surplus	4,795,203	4,618,543
†Common dividend	270,000	
Profit and loss surplus	\$4,525,203	\$4,618,543

*Manufacturing, operating and administrative expenses, maintenance, repairs, etc.
†Dividend was paid out of earnings for 1912.

The balance sheet as of December 31, 1913, compared with the preceding year, is given below:

Assets		
	1913	1912
Plants	\$33,320,525	\$33,373,197
Inventories	1,592,801	1,926,839
Investments	685,778	763,690
Accounts receivable	1,411,181	1,986,098
Other items	47,621	41,252
Cash	1,813,846	1,225,213
Total	\$38,871,753	\$39,256,290
Liabilities		
Preferred stock	\$13,500,000	\$13,500,000
Common stock	13,500,000	13,500,000
Bonds	6,901,000	7,037,000
Accounts payable	185,590	349,709
Accrued interest, taxes, etc.	259,960	251,037
Surplus	4,525,202	4,618,543
Total	\$38,871,753	\$39,256,290

President F. F. Fitzpatrick, in his accompanying remarks, says: "In the past year there has been erected on the property of the company at Chicago Heights, Ill., a modern and well-equipped plant for the manufacture of springs. It is expected this plant will, because of its favorable location, fully justify the expenditure. Throughout the early part of the year 1913 the business of this company was of most favorable proportions, nearly all of the plants being operated to their full capacity. About the middle of the year a marked curtailment of buying by the railroads was evident, and since then the company has suffered, in general with other manufacturers who rely upon this class of work for the larger portion of their business."

Production of Spelter in 1913

The production of spelter in the United States in 1913, as set forth in the annual statement by C. E. Siebenthal, of the United States Geological Survey, was 346,676 net tons. This is an increase of 7870 tons over the production of 1912. These figures apply only to primary spelter and not to secondary spelter recovered from drosses, skimmings and old metals. The production of secondary spelter from all sources in 1913 was about 53,000 tons, practically the same as in 1912. The world's production of spelter in 1913 is given as 1,103,359 tons (subject to revision), as compared with 1,070,045 tons in 1912, an increase of 33,314 tons. The statement, which is in the form of the usual folder, gives the names and locations of producers, with the number of retorts in operation and building at the close of 1913, also price and production curves for the years 1906 to 1913.

The bi-monthly examination of sales of bar iron for January and February was made at Youngstown this week, and it was found that the average selling price on shipments in those two months was 1.159c. Under the scale of the Amalgamated Association this entitles the puddlers to a rate of \$5.70 per gross ton for March and April, which is a reduction of 15c. on the January and February rate of wages.

Pittsburgh and Valleys Business Notes

At Pittsburgh, March 2, George O. M. Johnston was appointed receiver for the McClure Company, jobber in tin plate and metals, whose warehouses are located in the Terminal Building in that city. The court gave the receiver authority to continue the business. The debts of the company are said to amount to \$70,000, with assets in excess of this amount.

All employees of the Vandergrift, Leechburg, Hyde Park and New Kensington plants of the American Sheet & Tin Plate Company have been notified by the superintendents of these works that they must resign from fraternal organizations which maintain side-boards and serve liquor to members. Employees who refuse to comply with this rule will be subject to dismissal.

The Cambria Steel Company, Johnstown, Pa., will build a large warehouse this summer for the storage of wire products. It also intends to increase largely the capacity of the wire fence department by installing a number of additional fencing machines. The company is very busy in its wire department, running its rod and wire mills to full capacity.

The Myerstown Foundry & Mfg. Company, Myerstown, Pa., has leased the plant formerly occupied by the Stoeber Foundry & Mfg. Company, and will manufacture the Stoeber line of cast-iron boiler fronts and castings for horizontal return tubular boilers and also vertical boiler castings. It will also furnish steel plate fronts supplied with cast-iron flue; fire and ash-door frames fitted with doors; trench plate, furnace and rolling-mill work, and other gray-iron castings in the rough or fitted.

The B. A. Groah Construction Company has moved its offices from the Empire Building to 847 West North avenue, North Side, Pittsburgh.

Plans are under way to organize a company at Youngstown, Ohio, with a reported capital of \$200,000, to build a mill at Struthers, east of Youngstown, for the fabrication of pipe. The company proposes to handle the larger sizes of conduits and also do valve work and be in position to equip pumping stations and to assemble material for pipe lines. The site selected for the new plant comprises seven acres and is on the proposed line of the Ohio & Pennsylvania Belt Railroad.

The two blast furnaces and 10 of the 11 open-hearth furnaces of the LaBelle Iron Works, Steubenville, Ohio, are in operation, and the finishing mills are running to nearly full capacity, with the exception of the plate mills. In the lap-weld pipe department two furnaces are being rebuilt and some new equipment added. The annual meeting of stockholders of this company was held in Wheeling, W. Va., on Tuesday, March 10, at which the former officials and directors were re-elected.

In regard to the recent reduction in rates paid to tonnage men at the Ohio works of the Carnegie Steel Company, Youngstown, a statement has been issued as follows: "In the last year or more the company has made some radical changes in the equipment of the plant in question which have greatly increased its output. The rollers, who are paid by the ton of steel produced, naturally benefited by the changes. Some were getting \$25 per day of eight hours and not doing any more work than when they received \$18 or \$19 per day, therefore their base wages were reduced to meet the difference. There was no cut made in wages of general labor or that paid by the hour."

The Des Moines Bridge & Iron Works, Pittsburgh, has changed its name to the Pittsburgh-Des Moines Steel Company, but there has been no change in the management. The company has structural steel fabricating plants at Des Moines, Iowa, and Neville Island, Pittsburgh, and the change in name was to indicate better the territory covered by the company.

At the annual meeting of stockholders of the Pittsburgh Tin Ware Mfg. Company, held in Pittsburgh last week, directors were re-elected as follows: Harry Palley, J. N. Palley, F. L. Falck, C. J. DeMuth and J. Lewis Palley.

Regarding the report that the Westinghouse Electric & Mfg. Company, East Pittsburgh, will build a plant at Trafford City, Pa., for the manufacture of electric locomotives, Guy E. Tripp, chairman of the board of directors, states that the matter has been considered in a tentative way, with no definite decision reached.

Creditors of the Pittsburgh-Buffalo Company, which went into the hands of receivers some time ago, have appointed a committee to devise plans for reorganization. It will co-operate with the receivers in financing any funds necessary to continue the operation of the properties, pending their refinancing or sale to an advantage.

Notice has been filed at Harrisburg, Pa., by the Braeburn Steel Company, Pittsburgh, of an increase in its bonded indebtedness from \$100,000 to \$175,000.

The Pennsylvania Pneumatic Company, Erie, Pa., will increase its capital stock and build a factory for the manufacture of the Barr unit-compound air compressor. H. Edsil Barr is vice-president.

The Distilled Water Ice Company, Youngstown, Ohio, will shortly build a new artificial ice making plant.

The city of Youngstown has sold \$250,000 in bonds for an extension to the city water works.

The General Fire Proofing Company, Youngstown, Ohio, at its recent annual meeting, re-elected directors as follows: M. I. Arms, W. H. Foster, W. P. Arms, Charles H. Booth, J. T. Harrington, A. P. White and Henry Wick. The officers reported a good year, with business expanding in every department, especially metal furniture. Myron I. Arms was re-elected chairman of the board; W. H. Foster, president; J. T. Harrington and A. P. White, vice-presidents; R. M. Bell, secretary and treasurer; C. Y. Farrell, assistant treasurer and cashier.

Westinghouse interests in the Pittsburgh district—Westinghouse Electric & Mfg. Company, Westinghouse Air Brake Company, Westinghouse Machine Company, Union Switch & Signal Company, R. D. Nuttall Company and Pittsburgh Meter Company—held their annual banquet at the Fort Pitt Hotel on the evening of March 7, under the auspices of the Westinghouse Club. The toastmaster was W. A. Bole, assistant general manager of the Machine Company, and the speakers were C. A. Terry, vice-president of the Electric Company; A. L. Humphrey, vice-president and general manager of the Air Brake Company; Col. H. G. Prout, vice-president and general manager of the Switch & Signal Company, and Guy E. Tripp, chairman of the board of directors of the Electric Company.

An address on safety at what was called a safety rally, participated in by some 300 employees of the Cambria Steel Company, was given at the Cambria Library, Johnstown, Pa., Saturday evening, March 7, by James B. Douglas, of the United Gas Improvement Company, Philadelphia. The meeting was presided over by H. C. Wolle, general superintendent Cambria Steel Company. Both lantern slides and motion pictures covering accident prevention subjects were shown. Remarks were made by D. M. Stackhouse, assistant general superintendent, who outlined the safety work being done at the Cambria Works.

The annual exhibit of evening work of the School of Science and Technology of Pratt Institute, Brooklyn, N. Y., will be held on Wednesday evening, March 18. The shops, laboratories and drawing rooms will be open to the public and an opportunity given to view students at work. The instruction given includes technical chemistry, machine design, strength of materials, machine work and tool making, pattern making and sheet metal work.

An investigation of the possibility of utilizing titaniferous magnetites in the electric furnace for the direct manufacture of iron-titanium alloys, such as being used in making special grades of steel, is to be undertaken by the National Bureau of Mines, Dr. Joseph A. Holmes, director.

Personal

Henry Souther, the prominent metallurgist, has identified himself with the Ferro Machine & Foundry Company, Cleveland, Ohio, and has been elected vice-president. Since his graduation from the Massachusetts Institute of Technology, in 1887, Mr. Souther has been prominent in the fields of metallurgy and engineering. He began his career with the Pennsylvania Steel Company, Steelton, Pa., leaving there in 1893 to become engineer for the Pope Mfg. Company, Hartford, Conn. In 1899 he opened an office at Hartford and offered his services as an independent consulting engineer. In was in this capacity that he became prominent in connection with the automobile and allied industries. He was president of the Society of Automobile Engineers in 1911. For the last four years or so he has been especially identified with the Standard Roller Bearing Company, being responsible for the character of material used and quality of the product. More recently his work has involved questions of management and system, sometimes leading directly into the field of the efficiency engineer.

Robert Wuest, former commissioner of the National Metal Trades Association, spent February in Algiers. He will remain abroad for some months.

C. C. Hayward, who for the past three years has been connected with the sales department of the Jones & Laughlin Steel Company, Cincinnati, Ohio, has resigned to accept a position as salesman for the Ashland Fire Brick Company, Ashland, Ky.

F. L. Gohl, the Chicago representative of the Allen-Bradley Company, manufacturer of electrical controlling apparatus, has moved his office from the Commercial National Bank Building to 307 Webster Building, 327 LaSalle street. This change was necessitated by a decided increase of business, the old offices having proved too small.

William D. Mainwaring, who recently established himself as production engineer, in the Rockefeller Building, Cleveland, Ohio, and Francis J. Peck & Company, engineers and chemists, Cleveland, have effected a working agreement which is calculated to round out their service to clients.

H. W. Schafer, who has been associated with the Dempster Mill Mfg. Company, Beatrice, Neb., for the past 25 years, filling the position of buyer for the greater part of that time, and also a director and vice-president for a number of years, withdrew from the company February 1, to engage in other business. He has been succeeded as buyer by R. H. Barger.

Harry N. Trimble, of Trimble, Mudge & Co., dealers in iron and steel scrap, Frick Building, Pittsburgh, has sailed for the Bermudas, to be gone a month.

John Bindley, vice-president of the Pittsburgh Steel Company, Pittsburgh, has sailed on a Mediterranean trip.

John A. Coyle, who designed, built and operated the foundry of the Hess Steel Castings Company at Bridgeton, N. J., has resigned and is now located in Pittsburgh.

Albion T. Aiken, one of the oldest superintendents in point of service at the Edgar Thomson works of the Carnegie Steel Company at Bessemer, Pa., has been retired on a pension. He had been employed by the company for over 30 years.

J. W. Henderson, Gulick-Henderson Company, engineer, 525 Third avenue, Pittsburgh, has been appointed head of the bureau of smoke prevention of Pittsburgh, succeeding J. M. Searle, resigned.

Joseph McDonald, superintendent of the Franklin open-hearth works of the Cambria Steel Company, Johnstown, Pa., was severely burned in an explosion last week. His injuries, though painful, are not regarded as serious.

Charles E. Dinkey, general superintendent of the Edgar Thomson works of the Carnegie Steel Company, has been elected president of the Board of Commerce at Braddock, Pa.

George A. Gallinger, of Pittsburgh, has been placed in charge of the pneumatic tool department of the Ingersoll-Rand Company, with the title of manager of pneumatic tool sales. His headquarters will be at 11 Broadway, New York City. After an experience of 12 years in developing a general line of pneumatic tools, the Ingersoll-Rand Company feels warranted in establishing this special department and in placing at the head of it a man who understands the business from a mechanical as well as a commercial standpoint.

Frederick E. Bausch, manager Hooven-Owens-Rentschler Company, St. Louis, has been made chairman of the St. Louis local committee of the American Society of Mechanical Engineers.

E. P. Worden, manager Fred M. Prescott Steam Pump Company, has been made chairman of the Milwaukee local committee of the American Society of Mechanical Engineers.

A local committee of members of the American Society of Mechanical Engineers at Buffalo has been appointed as follows: W. H. Carrier, chief engineer Buffalo Forge Company, chairman; James W. Gibney, manager Taylor Iron Works; S. B. Daugherty, chief engineer gas engine department, Snow Steam Pump Works; C. A. Booth, Buffalo Forge Company, and C. H. Bierbaum, vice-president Lumen Bearing Company.

Walter Wood, of R. D. Wood & Co., Philadelphia, who has been abroad for several months, will return this week.

A. A. Fowler, of Rogers, Brown & Co., New York, returned this week from a European trip.

D. B. Meacham, of Rogers, Brown & Co., Cincinnati, has returned from a month's cruise in the West Indies.

Obituary

WILLIAM GASKELL, head of the firm of William Gaskell & Son, bolt manufacturers, Greenpoint, Long Island, N. Y., died February 27 at the home of his son in New York City. He was born in Wigan, England, January 27, 1833, and served an apprenticeship of seven years in a foundry on the estate of Lord Belcarres. He then came to America, and, after working at his trade in various sections of the country, located in New York City, where his mechanical aptitude, business acumen and thorough reliability gained for him a substantial trade footing. In 1865 he established the firm above named and for 46 years operated a plant on East Twenty-fifth street, meanwhile starting a branch in Greenpoint. In 1911 the New York City property was sold for the purpose of extending the buildings of Bellevue Hospital and the business was consolidated in Greenpoint. His wife died some years ago. He leaves a son, Robert E. Gaskell, who is now the head of the firm.

STUART WOOD, junior member of the firm of R. D. Wood & Co., manufacturers of cast-iron pipe and machinery specialties, died March 9 of heart disease at the home of his brother Walter in Philadelphia, Pa. He was born in that city in 1853, was educated at Haverford College and Harvard University, and later took a special course in philosophy at a college in Germany. At the age of 24 he entered the employ of R. D. Wood & Co., which was founded by his father. He was president of the Tampa Water Works, Tampa, Fla., and a director in the Florence Iron Works, Florence, N. J.; Camden Iron Works, Camden, N. J.; Vineland National Bank, Vineland, N. J., and Market Street National Bank, Philadelphia. He had never married and was a member of a number of clubs.

PHILIP ROHAN, senior of three brothers who in 1871 organized the Rohan Brothers Boiler Works, died in St. Louis, March 5, after a short illness. In recent years he had not been connected with the boiler business. He leaves a widow and one son.

EDWIN M. HALL, treasurer of the Jefferson Union Company, maker of flanges and unions, Lexington, Mass., died February 11.

NOW AFTER LAKE CARRIERS

Proposition to Bring Lake Carriers Under Interstate Commission

WASHINGTON, D. C., March 11, 1914.—The publication of the recommendation of the House Committee on the Merchant Marine and Fisheries that the interstate commerce act be enlarged so as to bring all steamship lines under the supervision of the Interstate Commerce Commission has aroused great interest in transportation circles. It has been supplemented by the full text of the report of the investigation which the committee has just completed in pursuance of resolutions of the House calling for an exhaustive inquiry regarding alleged steamship combinations. The importance of the committee's recommendation is much enhanced by the general disposition of Congress at this time to regulate all forms of private enterprise conducted on a large scale.

RATES HAVE GONE DOWN STEADILY

One of the most interesting and important features of the report relates to consolidations among bulk carriers on the Great Lakes and deals specifically with combination of carriers chiefly engaged in the transportation of iron ore. The usual effect of combination, namely, an increase in rates, has not resulted from the consolidations among the ore carriers; on the contrary, the committee records with favorable comment the fact that, owing to the employment of improved types of steamers of large carrying capacity and improved machinery at terminals for the expeditious handling of iron ore and coal at a cost of only a few cents a ton, rates on these commodities have shown a marked decline in the past 20 years. Thus, the contract rate on iron ore from Escanaba to Ohio ports has declined from \$1 per ton to 45c., and from Ashland and other ports at the head of the Lakes from \$1.25 to 60c.

Fluctuations in rates have also shown a very noticeable decrease in recent years. From the reports made to the committee by nearly all the bulk carriers, it appears that in 1912 practically all companies charged the same rates. The prevailing rate on iron ore from the head of the Lakes to Erie ports was 50c.; from Marquette to Erie 45c., and from Escanaba to Erie 35c.; while the rate on coal from the lower Lakes to Lake Superior and Lake Michigan was reported by practically all the companies as 30c. Despite these favorable rates, the dividends of bulk freight carrying companies for the past five years, as reported to the committee by the companies, would indicate that their business is a profitable one.

The report states, however, that there has been a marked increase in recent years in consolidations among these bulk carriers. Of these consolidations at least eight are of sufficient importance, in the opinion of the committee, to deserve special mention and the essential facts with reference to each as reported to the committee by the managements of the companies involved are presented in the report.

EIGHT IMPORTANT CONSOLIDATIONS NAMED

The Pittsburgh Steamship Company, a subsidiary of the United States Steel Corporation, and by far the largest shipping consolidation on the Great Lakes, represents a combination of fleets formerly operated by four companies and it has also bought vessels from six others and besides has an interest as creditor in the preferred stock, bonds and mortgage notes of the Detour Dock Company, Bou-

tell Steel Barge Company, Port Huron & Duluth Steamship Company, and Great Lakes Engineering Works. Its fleet of 103 vessels (with a gross tonnage of 467,786) represents over 17.6 per cent. of the total gross tonnage of American vessels on the Great Lakes, exclusive of the line tonnage, and is engaged almost exclusively in the transportation of ore and coal.

The Gilchrist Transportation Company, incorporated in 1897, absorbed in 1903 eight companies and reported to the committee the ownership and operation of 44 vessels with a gross tonnage of 154,630, or over 5.8 per cent. of the total gross tonnage of American vessels on the Great Lakes, exclusive of the line tonnage. In January, 1910, the company was placed in the hands of a receiver, and, according to the press, in the latter part of April, 1913, and subsequent to the filing of the company's reply to the committee, a new merger was formed when the stockholders of the Lackawanna Steamship Company met and organized the Interlake Steamship Company. Thirty-nine freighters owned by the Lackawanna and five other steamship companies were combined with 17 vessels of the Gilchrist Company, whose vessels were sold and the company dissolved.

G. A. Tomlinson is manager of seven steamship companies with a combined total of 23 vessels of 125,228 gross tons, or 4.7 per cent. of the gross American tonnage on the Great Lakes, exclusive of the line tonnage. The official personnel of all the seven companies is practically the same.

H. S. Wilkinson is manager of the Great Lakes Steamship Company and Globe Navigation Company, together operating 27 vessels of 113,273 gross tons, or nearly 4.3 per cent. of the gross tonnage of American vessels on the Great Lakes, exclusive of the line tonnage. The two companies have practically the same personnel as regards officers. The Great Lakes Steamship Company, following its incorporation in 1911, purchased the properties of five other companies.

M. A. Hanna & Co., according to the reports received from the several companies constituting the group, manage the vessels of nine interests. The official personnel of these companies and their directors and leading stockholders are practically the same, and are closely identified with M. A. Hanna & Co. All the companies combined represent a total of 23 vessels with a gross tonnage of 103,608, or nearly 3.9 per cent. of the total gross tonnage for American vessels on the Great Lakes, exclusive of the line tonnage.

Hutchinson & Co. are managers of eight companies, representing a total of 18 vessels with a gross tonnage of 102,440, or over 3.8 per cent. of the total American Great Lakes tonnage, after eliminating the line tonnage. The official personnel of these companies is practically the same.

John Mitchell is manager of the Buffalo and Cleveland steamship companies, with a combined total of 18 vessels of 85,813 gross tons, or over 3.2 per cent. of the aforementioned total.

Pickands, Mather & Co. are managers of the Interlake Steamship Company, with a total of 18 vessels of 83,090 gross tons, or over 3.1 per cent. of the aforementioned total.

VARIOUS INTERESTS CLOSELY INTERLOCKED

Numerous other instances of common managements and in nearly all cases closely interrelated to the eight above-mentioned groups are cited by the committee as illustrative of the movement toward consolidation among bulk carriers.

The committee also states that an examination of

the personnel of the managements and leading stockholding interests of the various constituent companies forming the several consolidations, and the charter relations between the several groups, would seem to indicate that the leading consolidations of bulk carriers are themselves closely interrelated. A detailed examination of the names of officers, directors and leading stockholders of the various companies constituting the consolidations shows so many cases of interlocking interests among the several groups as to justify the conclusion, in the opinion of the committee, that the eight largest consolidations represent a community of interest. It should also be noted that the Pittsburgh Steamship Company, by far the leading bulk carrier, has extensive charter relations with the other seven groups.

A careful examination of the reports made to the committee shows the interrelations between the eight leading groups of bulk carriers already discussed and 29 other groups of less importance to be so numerous and intimate as to warrant the conclusion that the entire list of 37 groups, comprising 105 companies, firms and managements, represents a vast community of interest, which, if found necessary, could easily be dominated by the leading interests therein as regards rates and business policy. These 37 groups control 35.5 per cent. of the total Great Lakes tonnage, exclusive of the 144 line vessels and all other vessels under 1000 tons. They represent over 69 per cent. of the Lake vessels with a gross tonnage of 1000 or over; over 81 per cent. of all vessels whose tonnage exceeds 2000; over 94 per cent. of those exceeding 3000; over 96 per cent. of those exceeding 4000, 5000, and 6000 tons, respectively; and all of the vessels with a tonnage of 7000 tons or over.

While the investigation referred to was conducted by the House Committee on Merchant Marine and Fisheries, the recommendations for the extension of the interstate commerce act carries the matter into the domain of the Committee on Interstate and Foreign Commerce which now has before it several bills proposing to supplement the interstate commerce and anti-trust laws. It is therefore probable that the latter committee will take jurisdiction of the subject if the majority leaders of the House decide that legislation shall be attempted at the present session.

W. L. C.

Sparrows Point Rail Mill Started

The Maryland Steel Company has put two of its blast furnaces at Sparrows Point in operation in the past week. Having accumulated about 40,000 tons of rail orders recently, including 3000 tons from the Great Northern and 12,000 tons from the Atlantic Coast Line, the rail mill at Sparrows Point, which has been idle for a number of weeks, has been started up this week. Previous to June, 1913, the four blast furnaces of the company were in operation. In June furnace C was put out for rebuilding. In November furnace A was blown out for relining, and in December furnace D was banked. Furnace B was banked January 13, and between that date and last week no pig iron was produced.

The Nova Scotia Steel & Coal Company reports gross profits of \$1,255,954 for the year ended December 31, 1913. Deductions of bonded interest and other charges and appropriations left a balance for dividends of \$517,687, against \$386,456 the previous year. After payment of dividends on the preferred and common stocks the amount carried to surplus was \$75,287, against a deficit of \$55,944 at the close of 1912.

One furnace of the Alan Wood Iron & Steel Company at Swedeland, Pa., is about to go in blast after having been idle for several weeks.

Inquiry by Industrial Relations Commission

Beginning in the latter part of this month public hearings in important cities from New York to San Francisco will be held during the spring and early summer by the United States Commission on Industrial Relations, according to an announcement made Monday by Frank P. Walsh, chairman of the commission. Among the cities that probably will be visited are New York, Philadelphia, Boston, Paterson, Scranton, Pittsburgh, Buffalo, Wheeling, Charlotte, Greenville, Atlanta, Birmingham, Nashville, Louisville, New Orleans, Detroit, Indianapolis, Cleveland, Chicago, Houghton, Milwaukee, Madison, St. Louis, Kansas City, St. Paul, Denver, Trinidad, Dallas, Houston or Galveston, Los Angeles, San Francisco, Seattle, Butte and Lead.

Through examination of witnesses competent to speak for employers, trades unions, other labor organizations, unorganized employees and the general public, the commission hopes to obtain information concerning the industrial situation that will lead to constructive recommendations. Some of the subjects to be inquired into in each city are: Irregularity of employment, possibilities of ending irregularity and increasing production through scientific management, the activities of trades unions and employers' associations, and the extent and operation of governmental machinery for regulating the conditions of industry, including the relations between employers and employees. Witnesses desired by the commission will be summoned under the authority granted it by Congress, but volunteer testimony will be welcomed.

Hazleton Sheet Mill to Resume

The sheet mill at Hazleton, Pa., which has been idle for several years, is expected to be put in operation some time in April. A syndicate of Philadelphia capitalists has arranged with the committee of bondholders for the purchase of the mill. Announcement is made that the title of the property will remain in the committee for the present and will not be conveyed until it is successfully demonstrated that the prospective purchasers will make the industry a going concern. The syndicate has been named the Imperial Steel Company and will be headed by Enoch Stanford, who is a practical manufacturer of sheets and tin plates, having at various times managed sheet and tin plate mills in different parts of the country.

All directors were re-elected at the annual meeting of stockholders of the Bucyrus Company, South Milwaukee, Wis., as follows: H. P. Eells, W. W. Coleman, Otis H. Cutler, Herbert H. Dean, Daniel P. Eells, M. D. Follansbee, Arthur H. Lockett, Waldo H. Marshall, Gates W. McGarrah, Daniel E. Pomeroy, Edwin R. Stedman, Edmund K. Swigart, Joseph R. Terbell, J. H. Tweedy, Jr., and S. M. Fauchlain. The annual report of President W. W. Coleman, covering operations to December 31, 1913, showed a very material increase in business. Foreign trade was especially satisfactory. During the year a new plate shop and additions to the boiler shop and iron foundry at South Milwaukee were completed and placed in operation.

The new plant of the Barlow Foundry Company, Newark, N. J., is nearly completed and it is probable that possession will be taken about April 1. In addition to a foundry, 60 x 180 ft., there is a building, 85 x 200 ft., which is to contain offices, stockroom, pattern shop, etc. The company has just declared a semi-annual dividend of 3½ per cent. on its preferred stock. This is the second dividend which has been declared since the company increased its stock and began the erection of the new plant in the southern part of Newark, about a year ago. The company has been located for a great many years on Orange street, east of Broad.

The Acme Iron & Wire Works has started up its plant in Des Moines, Iowa, devoted to ornamental iron work.

The Lackawanna Steel Company

On page 619 of *The Iron Age* of March 5 the income account of the Lackawanna Steel Company for 1913 was printed. Since then the full report has been received. In that report, under date of March 2, President E. A. S. Clarke says:

"The various properties were operated the first nine months of the year 1913 at substantially full capacity; but in the last half of the year there was a marked falling off, both in volume of new orders and in prices, with consequent curtailment of operations in the last quarter, so that the total shipments for the year were only slightly greater than in 1912. However, the average price per gross ton received for the materials shipped was \$30.34, a gain of \$2.62 per ton over the corresponding figure for 1912; and is reflected in the increased earnings for the year. In fact, the company's net income of \$3,023,084.03 is the largest of any year in its history; and after deducting the special profit of \$267,200.90 arising from the sale by the Lackawanna Iron & Steel Company of its shares of stock in the Cornwall & Lebanon Railroad, the remaining profits from regular operations, amounting to \$2,755,883.13, exceed those of the next largest year, 1910, by \$222,778.42 and are equivalent to about 7.85 per cent. on the company's outstanding common stock.

"The company received, in 1913, from mines which it owns, or is interested in, and from other sources, 2,114,637 gross tons of iron ore, and produced a total of 986,985 gross tons of coke, and 959,995 gross tons of pig iron. It also produced 358,471 gross tons of Bessemer ingots, and 736,059 gross tons of open-hearth ingots, a total of 1,094,530 gross tons of steel ingots of all kinds. Shipments of products were as follows, all in gross tons, the figures for the three previous years being given for comparison:

	1913	1912	1911	1910
Standard rails	336,339	303,100	225,699	363,577
Light rails	8,376	14,499	18,521	26,288
Angle bars, fittings, etc.	75,606	68,782	35,424	60,071
Structural shapes	138,538	116,201	116,581	146,641
Plates	57,529	64,570	52,756	87,469
Merchant steel products	163,887	148,454	77,010	67,150
Sheet bars, slabs, billets and blooms	62,045	99,445	92,967	159,761
Pig iron and miscellaneous	142,601	168,495	141,405	171,558
Total	948,921	983,546	760,363	1,082,515

"Attention is again called to the increase in shipments of merchant steel products, confirming the judgment of the directors in choosing this particular line when planning for greater diversification of your company's products. The properties have, during the past year, been maintained in high physical condition.

"Completion of the two 200-ton tilting open-hearth furnaces, authorized about the end of 1912, and which were expected to become operative in the second quarter of 1913, was somewhat delayed; and they did not come into full operation until July and August. The results have exceeded expectations, both as to output and costs. The completion of the four additional stationary furnaces, also authorized in 1912, has been delayed; first, owing to the shortage of labor and inability to get material on time, and, later, purposely, on account of the reduction in business. They will be completed by the middle of the current year, in ample time to serve any probable demand for their output.

"The spike and bolt factory was started in April, 1913, and is proving a valuable addition to the company's Buffalo works.

"The surplus now stands at \$7,514,876.71. Or-

ders on hand are low, and operations to date during 1914 have been at less than 50 per cent. of full capacity; the outlook for business in the near future is not encouraging, nor can much improvement be expected until the railroads are put in a position that will justify them in purchasing more freely. Notwithstanding the satisfactory earnings in 1913, and the company's strong financial position, the directors, having in mind the doubtful outlook for 1914, have not deemed it wise to consider paying any dividend on the company's common stock."

All the profits were made in the first three quarters of the year, the last quarter showing a deficit of \$108,514.

February Copper Production and Stock

The report of the Copper Producers' Association for February shows the stock of copper on hand March 1 to be 78,371,852 lb. This is a decrease of 8,924,833 lb. from that of the month previous. The February statement of the association compares as follows with that of January:

	February, pounds	January, pounds
Stock of marketable copper of all kinds on hand at all points in the United States at the first of the month	87,296,685	91,438,867
Production of marketable copper in the United States from all domestic and foreign sources in the month	122,561,007	131,770,274
Deliveries of marketable copper in the month:		
For domestic consumption	47,586,657	47,956,955
For export	83,899,183	87,955,501
Total	131,485,840	135,912,456
Stock of marketable copper of all kinds on hand at all points in the United States at the close of the month	78,371,852	87,296,685

The reduction in surplus is partly explained by a falling off in production of 9,209,267 lb., the output for February being 122,561,007 lb. as compared with 131,770,274 lb. for January. Since there were three less working days in February than in January, the rate of production for February really exceeded that of January. This feature attracted comment since the smelters had severe weather to contend with. Domestic consumption in February, which was 47,586,657 lb., varied but little from that of January, being only 370,298 lb. less. The falling off in foreign deliveries was 4,056,318 lb., as contrasted with the unusually large increase in January. The report was nearly in accordance with trade expectations.

Titaniferous Ores in Port Henry Furnace

The Northern Iron Company's furnace at Port Henry, N. Y., which the MacIntyre Iron Company is operating under lease for six months for an extensive test of titaniferous ores, has been running in the past two weeks on magnetic ores, the supply of prepared titaniferous ores being temporarily exhausted. A shipment of 10,000 tons of titaniferous ores from the Lake Sanford district will be made to Witherbee, Sherman & Co.'s concentrating mills at Mineville, N. Y., to be prepared for use at Port Henry. This concentration will give a titaniferous ore higher in iron than has thus far been used in the Port Henry run and the concentration will also eliminate some of the titanium. At the beginning of the Port Henry test the portion of titaniferous ore was 1-16. This was increased to $\frac{1}{8}$, and more recently to $\frac{1}{4}$. It is expected that the concentrates which will be shipped from Mineville will permit of the use of 50 per cent. of titaniferous ore.

The Terry Steam Turbine Company, Hartford, Conn., has concluded arrangements with Fraser & Chalmers, Ltd., whose head office is at 3 London Wall Buildings, London, England, whereby their organization will handle Terry turbines in England and its colonies, with the exception of Canada. This arrangement does not include marine forced draft sets, which are handled by Yarrow & Co., Ltd., Scotstoun, Glasgow, as heretofore.

The Machinery Markets

The general irregularity of the principal centers producing and selling machinery which was noted a week ago has given way to widespread quiet and expressions of disappointment in the trade are common. In the Eastern coast states the effects of the recent storms, from which recovery is not yet complete, are responsible for some of the easing up, though the absence of railroad buying and the timidity of capital are more general and more important factors. In New York the quiet conditions are a trifle more acute so far as there has been any change. New England has felt a reaction but this is pointed to as incidental to an improving market. Cleveland also is quieter, with both inquiries and sales in smaller volume, with the one exception of automatic screw machinery, which is selling better both at home and abroad. The Detroit trade has been somewhat more active with small propositions and the outlook for the foundries is brighter, but machine shops are chiefly engaged in repair work. The placing of orders in Chicago has proceeded so slowly that the trade is disappointed, despite the promise of new projects which would bring business. General business has been fair in Milwaukee and building construction indicates a future demand, but in machinery improvement has been light. The Central South has had some fairly good orders but warmer weather is necessary to cause real activity. After a spurt the St. Louis market has slowed down, which is attributed to hesitancy on the part of money pending the settlement of the regional bank question. In Birmingham recovery from the slump lately referred to is slow. Texas crop conditions are reported as good, which is usually a forerunner of a good demand of machinery. The Pacific Northwest is looking forward to the opening of the large lumber camps which will stimulate the demand for mill equipment. In San Francisco the machine tool demand is limited to small orders but dealers are hopeful.

New York

NEW YORK, March 11, 1914.

No change of any importance has come in the local market except that the slow conditions heretofore noted are still accentuated a trifle by the effects of the recent severe storms. All told, there is a good total of miscellaneous inquiries in the hands of the trade on which quotations have been sent out, but orders are coming along with exasperating slowness. Not only orders, but inquiries also, are irregular. Sales of second-hand machinery are fair only. The ship building companies along the Atlantic coast are fairly busy but few new contracts are in view. The Government arsenals are busy but few tools are now being bought for them, their equipment needs having been taken care of a few months ago. The list of the Seaboard Air Line, issued a month ago, is still the largest proposition out, but there is much uncertainty as to when action on it will come. The percentage of output of the gray and malleable iron foundries in northern New Jersey varies considerably. One foundry that turns out both gray and malleable is working between 70 and 75 per cent. capacity, but this degree of activity is the exception. A large jobbing foundry is operating between 40 and 50 per cent. and this more nearly approximates the general condition.

The comptroller of the city of Buffalo has been authorized to issue bonds to the amount of \$250,000 for the purpose of constructing a venturi meter and valve house at the waterworks pumping station at the foot of Porter avenue, rebuilding pumping engine No. 6, etc.

Engineer Frederick K. Wing, Buffalo, N. Y., has prepared plans for a sewage disposal plant, etc., to be constructed by the village of Fredonia, at an estimated cost of \$100,000.

The Aluminum Castings Company, Elmwood and Hertel avenues and the Erie Railroad, Buffalo, will build a one-story brick addition to its plant.

The Consumers Brewing Company, Jefferson and Best streets, Buffalo, will erect and equip an ice-making plant.

The Rochester Case Hardening Company, Rochester, N. Y., has been incorporated with a capital stock of \$10,000 by W. H. Allen, G. J. Schaffer and J. A. Schmey, to manufacture furnaces for case hardening, etc.

The LeValley McCloud Kinkade Company, Elmira, N. Y., has been incorporated with a capital stock of \$150,000 to manufacture and deal in plumbers' supplies, etc. H. C. Mandeville, E. W. Personius and B. L. Newman, of Elmira, are the incorporators.

The Athens Textile Company, Athens, N. Y., has been incorporated with a capital stock of \$50,000 by W. H. Arnold, S. Ely and C. A. Fox, to manufacture hosiery and underwear, and will build and equip a plant.

Butler & MacLaren, Inc., Harrison, N. Y., has been incorporated with a capital stock of \$100,000 to manufacture and deal in machinery. L. C. Butler, J. G. MacLaren and A. H. Stephens are the incorporators.

The Bishop Gutta-Percha Company, 420-430 East Twenty-fifth street, New York City, is building a factory on Twenty-fourth street, 25 x 99 ft., five stories.

New England

BOSTON, MASS., March 10, 1914.

Some slight reaction has been experienced in the machinery industry, and for the time being business is dull. The large orders which have caused a few of the machine tool houses to start on close to full capacity have not been duplicated. The fall in the curve of demand is probably normal. A depression of the line usually occurs here and there in the advance upward. Announcements of enlargements of manufacturing plants, especially in the metal industries, have increased in the week.

Plans are being figured by contractors for an additional factory building for Landers, Frary & Clark, New Britain, Conn. The structure will be 62 x 125 ft., eight stories, with wing 15 x 48 ft., for stair and elevator tower and toilet rooms.

The Union Mfg. Company, New Britain, Conn., manufacturer of chucks, will increase its works by the addition of two stories to a building 60 x 120 ft.

The Spinner Chuck Company, New Britain, Conn., has awarded the contract for its new factory building to be erected on Church street. The structure will be 50 x 154 ft., four stories, of mill construction.

The Bylund Foundry Company, Bridgeport, Conn., is about to receive bids for a new plant to be established in the adjacent town of Stratford. The works will consist of a main building 94 x 192 ft., of brick and steel, and a brick office building 40 x 70 ft. The company will join a group of highly prosperous manufacturing concerns which have established themselves in this section of Bridgeport in the past two years.

The Commercial Union Company has been organized at Ware, Mass., to manufacture pipe couplings and do a general foundry business. Everett J. Bouchard is the president and treasurer, and Michael J. Smith, clerk, the third director being Alderic E.

Gaudette, Worcester, Mass. The foundry building, recently occupied by G. A. Corser, has been acquired, and additions will be made as the business develops. A machine shop will be operated as well as a foundry.

The Naugatuck Malleable Iron Company, Naugatuck, Conn., will increase its works at Union City by the addition of a trimming and dressing room, of brick and steel construction.

The Waterbury Clock Company, Waterbury, Conn., has put in the foundations for a five-story addition, 50 x 182 ft.

The Coe Brass Company division of the American Brass Company, Ansonia, Conn., has awarded the contract for the grading and excavating for the tube mill which will be erected sometime in the near future, at an eventual cost of about \$1,000,000.

The British Xylonite Company, London, England, will erect a branch plant at Leominster, Mass.

The American Wrench, Bolt & Molding Machine Company is organizing at Holyoke, Mass., to manufacture a wrench-making machine and a bolt-making machine, the inventions of Thomas F. Sisson, who is employed by the International Steam Pump Company at the Deane works, Holyoke. Mr. Sisson is the inventor of a core-making machine, manufactured by the Modern Equipment Company, Providence, R. I., and this machine also will be taken over by the new company, it is stated. The plan is to establish works near Holyoke.

Announcement is made that the Holtzer-Cabot Company, Brookline, Mass., manufacturer of electrical equipment and supplies, will not rebuild the factory recently badly damaged by fire, but will erect new works in Jamaica Plain, Boston.

The Pratt-Reed Company, Deep River, Conn., will build an additional factory, 80 x 160 ft., four stories, of reinforced concrete, and a boiler house. Bids for power equipment are being considered.

The citizens of Lunenburg, Mass., have voted to establish a municipal lighting plant and water works system.

Chicago

CHICAGO, ILL., March 9, 1914.

New machinery business presents a discouraging prospect. There is apparently no lack of projects which hold out the promise of attractive business, but the placing of orders is disappointingly delayed. The policy of holding down purchases to a minimum, now being followed by the railroads almost without exception, is nowhere more pronounced than in connection with machinery requirements. General business also seems, very patently, to have fallen off from the rate of January and February.

The Reynolds Electric Flasher Company, 617 West Jackson boulevard, Chicago, has filed notice of a change in name to the Reynolds Electric Company.

The Chicago Pneumatic Pump Company, Chicago, has been incorporated with a capital stock of \$15,000 to manufacture pumps. The incorporators are E. J. Moline and M. E. Moline, with Louis J. Behan, attorney, 10 South LaSalle street.

The Chicago Porcelain Enamel & Mfg. Company, organized with a capital stock of \$10,000, will manufacture enameled ware, the incorporators being I. W. Foltz, attorney, 127 North Dearborn street; J. L. Robinson and Otto E. Rinehart.

The Sprague Canning Machinery Company, Chicago, has been organized with a capital stock of \$300,000, to engage in the manufacture of canners' machinery. The company was organized by K. H. Addington, attorney, 105 West Monroe street, L. A. Babcock and D. C. Trench.

The Simplex-Vapor-Vacuum Company, Chicago, has been incorporated with a capital stock of \$2500 by F. J. Murray, E. M. Lund and A. L. Ringo, 189 West Madison street, to manufacture power plant equipment.

The Rickert Mfg. Company, Chicago, has been organized with a capital stock of \$1200 by J. H. Rickert, 136 Long avenue, to manufacture metal specialties.

The Illinois Spring & Stamping Company, Chicago, has been organized with a capital stock of \$50,000, in the office of Huga J. Thal, attorney, 69 West Washington street, to manufacture steel springs and metal stampings.

The Central Screw Company, 5217 Cornell avenue, Chicago, has been organized with a capital stock of \$2500 to manufacture and deal in stove bolts, screws and other similar specialties. The incorporators are H. F. Kellogg, C. M. Denise and F. M. Kinney.

The Brunner Foundry & Machine Company, Peru, Ill., manufacturer of gas engines, has been sold to interests who plan to increase its resources and enlarge the plant.

The Northern Iron Works Company, Canton, Ill., and the David Wigert Boiler Works Company, Galesburg, have arranged a merger of the two companies with a capital stock of \$150,000. The consolidated plant will be located at Canton, Ill.

The Western Engineering & Mfg. Company, Utica, Ill., has been organized with a capital stock of \$25,000 to manufacture fireproof products.

The M. B. Hamilton Glove Company, Leavenworth, Kan., whose plant was recently destroyed by fire, will purchase new equipment for installation in temporary manufacturing quarters.

The McDonald Engineering Company, Chicago, Ill., has been awarded the contract for the steam pumping station plant for the counties of Louisa and Muscatine, at its bid of \$109,908. The plant is to be built at Wapello, Iowa.

The Danville Refractories Company, Danville, Ill., has been incorporated with a capital stock of \$300,000 by Charles J. Crawford, and others, and will equip a factory.

The Mound City Crystal Ice Mfg. & Coal Company, Cairo, Ill., has been incorporated with a capital stock of \$35,000 and will increase the equipment of its plant.

A syndicate of Chicagoans, and others, represented in East St. Louis, Ill., by Thomas Godfrey, is planning the establishment in East St. Louis of a plant, to cost about \$50,000, for the manufacture of bridge and other structural steel. J. P. Burgess and J. P. English, of Chicago, are also interested.

The Vindex Electric Mfg. Company, Aurora, Ill., has been incorporated with a capital stock of \$10,000 by T. E. Ryan, and others, and will equip a factory.

The Townsend & Thompson Company, Texarkana, Tex., has obtained a site in East St. Louis, Ill., for the erection of a woodworking plant to cost \$100,000. H. E. Townsend, formerly with the Studebakers, is interested.

The McClelland-Ward Company, Decatur, Ill., has been incorporated with a capital stock of \$100,000 by J. S. McClelland, and others, to equip for a general manufacturing business.

The Standard Tilton Milling Company, St. Louis, will build elevators with a capacity of 1,000,000 bu. at Alton, Ill.

The Browerville Electric Light & Power Company, Browerville, Minn., has been incorporated with a capital stock of \$10,000 to erect and operate an electric light and power plant. H. E. Hart, and others, of Browerville, are the incorporators.

L. F. Clark, Bellingham, Minn., will erect an electric lighting plant.

The village recorder, Lismore, Minn., will receive bids until March 18 for an electric lighting system, including an oil engine, generator, etc.

The city of St. Cloud, Minn., is in the market for an electrical pump for the pumping station. S. Seiberger is mayor.

K. C. Gaynor, Sioux City, Iowa, has purchased the electric lighting plant at Sioux Rapids, Iowa, and will make improvements.

The town of Glenwood, Iowa, is in the market for a boiler and generator, for its electric light plant.

The William Galloway Company, Waterloo, Iowa, will erect an agricultural implement factory at St. Boniface, Man.

O. E. Noble, city engineer, Manhattan, Kan., will receive bids until March 17 for a triplex power pump or a motor and centrifugal pump.

The city of Elk Point, S. D., has voted \$25,000 in bonds for the purpose of erecting an electric light plant.

The city of Denver, Col., has voted \$3,000,000 bonds for the construction of a municipal water plant.

The Lennox Furnace Company, Marshalltown, Iowa, is building a factory at a cost of \$140,000.

Philadelphia

PHILADELPHIA, PA., March 10, 1914.

The Lubin Mfg. Company, Twentieth street and Indiana avenue, Philadelphia, is building a two-story brick addition to its factory.

E. F. Houghton & Company, Third and Somerset streets, Philadelphia, leather manufacturer, is building a three-story addition to its factory at a cost of \$20,000.

The Lansdale Foundry Company, Lansdale, Pa., has been incorporated with a capital stock of \$25,000 by F. H. Saunder, Hatfield, Pa.; H. S. Moyer, David Orr, M. S. Moyer and R. J. Vogel of Lansdale. It will do a general jobbing business. The equipment will be electrically driven and will be completed by May 1. David Orr is secretary.

The Thompson Machine & Mfg. Company, Ardmore, Pa., has been incorporated with a capital stock of \$25,000 by Walter S. Thompson, Ardmore, Pa.; Frank P. Turner, West Chester, Pa.; Charles A. Hasseberg, Philadelphia, and others.

The Buffalo, Rochester & Pittsburgh Railway Company will enlarge its main shop at Dubois, Pa. The power house will be enlarged and additional machinery will be installed.

The Interwoven Mills Company, New Brunswick, N. J., is receiving bids for a factory, 107 x 150 ft., which it intends to erect at Carlisle, Pa., at an estimated cost of \$40,000.

The East Broad Top Railroad & Coal Company, Orbisonia, Pa., is in the market for a 70-ft. turntable, second hand. E. C. Hall is general manager.

R. B. Whittaker, Second and High streets, Millville, N. J., will erect a garage, 50 x 100 ft., at an estimated cost of \$12,000.

Detroit

DETROIT, MICH., March 10, 1914.

Reports from local machinery dealers indicate that the market has been somewhat more active the past week. Business in standard tools was steady with single tool propositions predominating. Some new business in wood working equipment was noted and some lines of special machinery were in good demand. The second-hand machinery market was only moderately active. Manufacturing machinists are booking a fair run of new orders, but the bulk of the work now being done is on repair jobs. The outlook in the foundry trade is brighter and plants are fairly busy. Considerable new work is reported in building circles and architects state that as soon as the weather becomes favorable for outdoor operations a large number of projects will be placed before the contractors.

The Burroughs Adding Machine Company, Detroit, will shortly begin the erection of another factory building. The plans call for a structure 55 x 130 ft., of steel and concrete. It will be devoted entirely to heat treating and the cleaning of parts used in the manufacture of adding machines.

The Peoples Ice Company, Detroit, has acquired a building 100 x 183 ft., three stories, and will establish an ice-making plant, with a capacity of 100 tons a day.

The Ford Motor Company, Detroit, has broken ground for a new building to be used as an extension of its power plant.

The Buhl Malleable Company, Detroit, has awarded the contract for an addition to its power plant.

The Bidwell Socket Company, Detroit, has been incorporated with a capital stock of \$2000 to manufacture sockets. The incorporators are Benjamin B. Bidwell, Milton Growel and John Fockler.

The Continental Starter Company, Detroit, has been incorporated with a capital stock of \$20,000 to manufacture automobile starters. The incorporators are Henry J. Guthard, Nelson A. Blum and Herbert Thomas.

The Murphy-Potter Company, Detroit, has changed its name to the Brass & Aluminum Foundry & Machine Company.

The city commission of Wyandotte, Mich., is having plans prepared for altering and adding to the equipment of the municipal waterworks plant. A. S. McClennahan is superintendent.

Negotiations have been completed by the Commercial Club of Manistique, Mich., for the establishment of a handle factory. The new company will be known as the Manistique Handle & Mfg. Company, and work on the factory will be commenced shortly.

The United Steel & Wire Company, Battle Creek, Mich., has increased its capital stock to \$60,000 to provide for the addition of several new lines to its manufactures. An enlargement of the factory will be necessitated.

The Michigan Cabinet Company, the Kakorost Company and the Benedict Clamp Company, all of Grand Rapids, Mich., have formed a merger capitalized at \$250,000 to be known as the Grand Rapids Handscrew Company. It will manufacture manual training equipment and industrial furnishings exclusively.

The American Box Board Company, Grand Rapids, Mich., has awarded the contract for its new factory. The plans call for a building 200 x 485 ft., two stories, of mill construction. In addition to the manufacturing equipment, six elevators and other miscellaneous apparatus will be required.

As a result of the establishment of the assembly plant of the Briscoe Motor Company at Jackson, Mich., the Jackson Metal Products Company has been formed to manufacture automobile radiators, fenders and other sheet metal parts.

Cincinnati

CINCINNATI, OHIO, March 9, 1914.

A prominent machine tool manufacturer, who was a guest at the annual banquet of the Cincinnati branch of the National Metal Trades Association, given here last week, states that conditions are gradually on the mend. He is just completing a tour embracing all the important machine tool centers. To a certain extent this view coincides with reports made last week by a number of local machine tool builders who have considerable business in sight. Requirements are slow in developing into orders. Every railroad shop in this part of the country is crowded with repair work, due in a measure to the large number of locomotives that have lately been condemned by the inspectors, and from this particular branch of the trade there ought to be a demand for a large number of tools at an early date. Woodworking equipment, as well as small electrical machinery, are both in fair demand.

The Mockbee Forge Company, recently organized, has leased part of the old Bickford plant at 528 East Front street, Cincinnati, and is fitting it up for general jobbing work. The only equipment not yet provided for is a second-hand 100-lb. Bradley hammer.

The Cincinnati Rubber Mfg. Company, Norwood, Ohio, contemplates making some extensive additions to its plant at an early date. Nothing is yet known as to machinery requirements.

The American Oxygen Company has opened an office in the Union Central Life Insurance Building, Cincinnati, and has made arrangements to build a large branch plant at Oakley, to have a capacity of 30,000 cu. ft. of oxygen gas per day. Considerable special equipment will be required, but no electric generators.

The Black Diamond Mfg. Company, 1215 Bank street, has commissioned Martin Fisher, architect, to draw plans for an addition to its factory, 20 x 50 ft., one story, of brick construction.

The Ohio Knife Company, Cincinnati, is moving into its new factory on Dremen street. Its output will

be trebled. Nearly all machinery equipment has been provided for.

It is currently reported that the receivership of the Barney & Smith Car Company, Dayton, Ohio, will soon be lifted, and that the stockholders' committee has plans under way for adding to the output.

The Chase Colvin Fence Company, South Charleston, Ohio, has been incorporated with a capital stock of \$30,000 and will establish a plant. Chase Colvin is one of the principal incorporators.

It is reported that the Kramer Brothers Foundry Company, Dayton, Ohio, intends making some additions to its plant.

The Belfont Nail Mill Company, Ironton, Ohio, has let contract for a cooper shop that will be 60 x 100 ft., one story, of brick and steel construction. Nothing is known as to the machinery requirements.

The Hope Forge & Machine Company, Mt. Vernon, Ohio, has been incorporated with \$200,000 capital stock by D. B. Grubb, A. H. Sipe, C. N. Leroy, C. E. Conrad and Howard Spitzer.

Power plant equipment will be required by the Squibbs Distilling Company, Lawrenceburg, Ind. It has let a contract for a large concrete grain elevator. Steigner, Hughes & Alves, Cincinnati, are the architects in charge.

The Mansfield Gas Light Company, Mansfield, Ohio, will install some additional power plant equipment.

Milwaukee

MILWAUKEE, WIS., March 9, 1914.

Machinery business shows scant improvement, the volume little better than of late. No important bookings are reported and orders are principally for single tools to fill only immediate requirements. General business shows fair improvement, which is reflected by the gains in the Milwaukee construction record. The metal trades labor situation is quiet and there are plenty of men available for all needs. Unseasonable weather is blamed for part of the present stagnation, giving rise to hopes for more rapid progress.

The Milwaukee Grinder & Specialties Company, Manufacturers Home Building, Milwaukee, is receiving bids for its factory, 90 x 120 ft., two stories, of reinforced concrete, at Twenty-second and Sycamore streets. Klug & Smith, Mack Block, are the engineers.

The Milwaukee Steel Structural Company, Milwaukee, received the contract for the steel work on the \$35,000 plant at Fifty-seventh avenue and Burnham street, of the Wisconsin Machinery & Mfg. Company, Milwaukee. Equipment is now being contracted for. Klug & Smith, Mack Block, are supervising engineers.

The O'Neil Oil & Paint Company, 267 East Water street, Milwaukee, which increased its capital from \$250,000 to \$350,000, will build six paint mills, etc. George F. O'Neil is president.

The C. A. Lawton Company, DePere, Wis., manufacturer of gasoline engines and electric light systems, is reaching out into foreign territory and plans to greatly enlarge its production. A large order has just been booked from Leon Pujos, Mayenne, France, who has recently entered the machinery business and will act as its agency in France.

The Standard Electric Company, Racine, Wis., manufacturing massage vibrators, mixers and electrical appliances, has purchased the plant of the McCrum-Howell Company. It will occupy the entire McCrum-Howell building and will continue the lease of the foundry building now held by the Racine Aluminum & Brass Company. George C. Schmitz is general manager.

The Electric Fire Alarm Company, Two Rivers, Wis., has decided to move its works to Sheboygan, Wis., where local capital has become interested. The operations will be greatly enlarged.

The Wausau Paper Mills Company, Wausau, Wis., has commissioned L. A. DeGuere, Grand Rapids, Wis., to prepare plans and take bids for the rebuilding and re-equipping of the mills at Brokaw, Wis., which were

destroyed by fire two weeks ago. The work will cost over \$100,000.

Edward Stubbe and Walter Stelter, Fall Creek, Wis., are planning to build a garage, 30 x 40 ft., to include a complete repair shop.

The Valecia Condensed Milk Company, Madison, Wis., is planning to build a dairy and power house at Richland Center, Wis., to cost \$75,000.

The LaCrosse Gas & Electric Company, LaCrosse, Wis., announces plans for enlargement and improvement involving \$150,000. The work is in charge of A. W. Higgins, chief engineer.

The Three Men Rail Laying Machine Company, LaCrosse, Wis., has been organized with a capital stock of \$25,000 by Patrick H. Madden, Frank L. Pierce, and George H. Gordon, attorney, to engage in the manufacture of railroad mechanical appliances.

The Vetter Mfg. Company, Stevens Point, Wis., will build a sawmill in Marathon County, Wis., with a capacity of 50,000 ft. daily.

The Railway Materials Company, Chicago and New York, has taken a long term lease on the former Wisconsin Central Railway carshop group at Stevens Point, Wis., which have been idle for 12 years, and will equip for the production of steel-backed brake shoes.

The Wisconsin Light, Power & Milling Company, Fond du Lac, Wis., has been organized with a capital stock of \$10,000 by Oscar A. Huelsman, and others, to construct, equip and operate electric, gas, or other power plants. Plans are incomplete.

The West Bend Aluminum Company, West Bend, Wis., has placed the planning and construction of its new plant at West Bend in charge of F. A. Little & Co., Fond du Lac, Wis. It will be 60 x 240 ft., one and two stories, and the power house 40 x 50 ft.

The Hale Electric Company has been incorporated at Columbus, Wis., with a capital stock of \$30,000 to construct and operate an electric light and power plant. The principal stockholders are J. T., E. M. and H. S. Hale.

The Baxter Sash & Door Company, Superior, Wis., has taken out a permit providing for the erection of an addition to its factory.

Wittenberg, Wis., has voted a bond issue of \$300,000 for a municipal waterworks and sewage disposal system. W. G. Kirchhoffer, Madison, Wis., is consulting engineer.

W. J. Schulz, proprietor of an electric light and power plant at Butternut, has engaged H. R. Wuerffel, electrical engineer, Chicago, to plan and supervise the enlargement of the plant as a commercial producer for Butternut and vicinity.

The Bayfield Electric Company, Bayfield, Wis., will remodel its plant and install additional machinery, at an estimated cost of \$10,000. Mr. Herrick is superintendent.

The Northwestern Fuel Company, Washburn, Wis., will rebuild its coal dock power equipment and install electric apparatus throughout. The changes will require a battery of two 200-hp. motors; one 100-hp. motor and two 45-hp. motors.

Cleveland

CLEVELAND, OHIO, March 10, 1914.

Conditions have quieted down in machinery lines and dealers generally report a very light volume of business and few inquiries. Sales during the week were confined almost entirely to small single tool orders. Encouraging reports are coming from makers of automatic screw machinery who report an improvement in the demand and especially in foreign orders. Railroad buying is almost at a standstill. The Lake Shore & Michigan Southern Railway has held up the placing of orders for machinery for its new shops at Air Line Junction. A good volume of new building work is coming out in this city and this is expected to create considerable demand for power equipment.

Arthur G. McKee, engineer, Rockefeller Building, Cleveland, has taken a contract for remodeling the power plant of the H. F. Watson Company, Erie, Pa., which

will be removed from its present location. The contract includes stokers for all the boilers, coal and ash bins, conveying equipment and a storage trestle. The new 400-hp. boilers will be added to the present equipment of six boilers, making the boiler capacity 3100 hp. The required equipment, with the exception of the additional boilers, will be purchased by Mr. McKee.

The plant of the Madison Foundry Company, Cleveland, Ohio, was totally destroyed by fire March 5, the loss amounting to about \$60,000. Steps will be taken for the rebuilding of the plant as soon as possible. Entire new equipment will be required.

Goldberg, Davidson & Co., New York City, are establishing a branch plant on West Ninth street, Cleveland, for the manufacture of metal buttons. Orders have been placed for a small amount of machinery equipment.

The Peters Machine & Mfg. Company, 1071 Power avenue, Cleveland, is building a factory, 50 x 200 ft., one story, at Madison avenue and Seventy-fourth street.

The R. F. McKenzie Company, 1600 Woodland avenue, Cleveland, is building a four-story addition to its factory at a cost of \$30,000.

The Cleveland-Akron Bag Company, which has placed contracts for a new plant in Cleveland, will install in connection with it a power plant which will be equipped with two 200-kw. units and two 250-hp. boilers.

A motor truck garage that will accommodate 200 trucks will be erected on Carnegie avenue, Cleveland, by a company in which Howard Lattimer and J. P. Gager are leading promoters. E. F. Gibbons is engineer.

The Bettcher Mfg. Company, Cleveland, has increased its capital stock from \$30,000 to \$50,000.

It is announced that the Toledo Pipe Threading Machine Company, Toledo, Ohio, will double its present capacity by building another plant on a site on Summit street. Plans for a building 100 x 160 ft., two stories, are being prepared by George S. Mills, architect.

Plans are being prepared for the new plant to be erected in Massillon, Ohio, by the American Stamping & Enameling Company. The first building will be a structure 200 x 300 ft.

The plant of the Sandusky Auto Parts & Motor Truck Company, Sandusky, Ohio, has been sold under order of the United States Court in bankruptcy proceedings to James J. Dauch, president of the Hinde & Dauch Company, Sandusky, for \$78,000. It is stated that Mr. Dauch expects to use the plant to manufacture tractors and other equipment.

W. D. Scott, Martins Ferry, Ohio, will build a plant for the manufacture of picks, shovels, drills and other miners' tools.

At a recent meeting of the Reeves Engineering Company, Mount Vernon, Ohio, the stockholders approved the action of the board of directors in transferring the company's property to a new company, which has been organized with a capital stock of \$200,000 under the name of the Hope Forge & Machine Company. The new company will manufacture the Reeves gas engines and couplers for pipe line work. Some new machinery for the manufacture of the couplers will probably be installed. The officers of the new company are W. H. Hammond, president; H. D. Hildebrandt, vice-president, and R. S. Lord, secretary and treasurer.

The Marsh-Brightman Nut Company, Sandusky, Ohio, has been incorporated with a capital stock of \$50,000 by E. H. Marsh, E. F. Brightman and others to manufacture nuts and nut making machinery.

The City Council, Upper Sandusky, Ohio, has voted an issue of \$25,000 worth of bonds for the construction of a municipal electric lighting system.

Plans for a garbage disposal plant have been approved by the City Council in Akron, Ohio, and a bond issue of \$90,000 has been authorized for its construction. Bids will shortly be received for this plant and for a sewage disposal plant to cost \$350,000. R. Winthrop Pratt, Cleveland, is the engineer.

The Sebring Pottery Company, Sebring, Ohio, will be enlarged by the erection of an addition 85 x 120 ft. and the installation of two additional kilns.

Wheeling

WHEELING, W. VA., March 9, 1914.

The Wheeling Ceiling & Roofing Company, Wheeling, W. Va., has been incorporated with a capital stock of \$150,000 to manufacture iron and steel roofing. W. C. Ackerman, Frank W. Nesbitt, William F. McKinley, and others, are the incorporators.

The water commission, Steubenville, Ohio, is advertising for bids for the construction of a filtration plant. Bids opened February 20 were all rejected.

The Metropole Motor Corporation, Port Jervis, N. J., is reported to be negotiating for the location of its plant in Morgantown, W. Va. It asks for a guarantee of approximately \$125,000.

The Liquid Gas & Fuel Company, successor to the Schenk Liquid Gas Company, Warwood, W. Va., will build a large plant for the manufacture of its product in Charleston, W. Va. It has a capital stock of \$100,000. Albert Schenk, Wheeling, is president.

Donovan's Boiler Works, Parkersburg, W. Va., has placed the contract for its new building and entire equipment.

The St. Louis Hydraulic Brick Company will build a plant near Martinsburg, W. Va.

The John M. Kisner & Brother Lumber Company, Fairmont, W. Va., has been incorporated with a capital stock of \$50,000 by John Kisner, and others.

The Columbia Gas & Electric Company, Branchland, W. Va., has started work on a \$250,000 compressing station.

Birmingham

BIRMINGHAM, ALA., March 9, 1914.

Machinery dealers do not take a pessimistic view of the state of trade, but they do agree that the recovery is very slow. The general volume of business has increased slightly. There is no indication of expansion either in the coal mine or sawmill lines.

The Gulf States Steel Company, Birmingham, will install machinery for the manufacture of tie plates and additional wire-weaving machines.

The Birmingham Railway, Light & Power Company, Birmingham, will build, at a cost of \$125,000, a substation for receiving electricity from the hydro-electric plant of the Alabama Power Company on the Coosa River.

The Tuskegee Normal & Industrial Institute will install a waterworks system, electric system and make other improvements at Tuskegee, Ala., at a cost of \$200,000. Booker T. Washington is president.

E. T. Beatty, Birmingham, will rebuild his machine shop, recently burned, and install new machinery.

The Tennessee Coal, Iron & Railroad Company will expend \$125,000 to rebuild one of its blast furnaces at Ensley, Ala.

J. B. McCrary & Co., Atlanta, Ga., are preparing plans for a waterworks system, at an estimated cost of \$30,000, for Cullman, Ala.

The Interstate Chemical Corporation, Macon, Ga., is about to open bids for the construction of a mill, etc., and the necessary machinery, at an estimated cost of \$90,000.

The town of Latta, S. C., has voted \$25,000 in bonds for electric light, sewage and waterworks systems.

The Interstate Naval Stores Company, Macon, Ga., has been incorporated with a capital stock of \$25,000 by S. W. Irvine, and others. It will establish a factory for the manufacture of naval stores.

The Metter Cooperative Light & Power Company, Metter, Ga., has been incorporated to establish an electric light and power plant by J. R. Dixon, and others.

The city of Milton, Fla., voted an issue of \$20,000 of bonds for waterworks purposes.

The city of New Smyrna, Fla., will build a waterworks and sewer system.

The Burton-Schwarz Cypress Company has begun the establishment of a mill at Perry, Fla., with a daily capacity of 100,000 ft.

The town of Micanopy, Fla., has voted \$10,000 in bonds for the installation of a municipal electric light plant.

The Central South

LOUISVILLE, KY., March 9, 1914.

Machinery dealers have been kept busy by a rush of fairly good orders. Inquiries have been received from many sections. With warmer weather, a greater industrial activity will follow, and the beginning of work on projected manufactories and additions will add to the volume of business. Ice factories and refrigerating plants are sending in late orders. Small electrical equipment is moving well, especially motors of 10 to 25 hp. Boilers of small sizes are in general demand.

The Safety Door Securer & Mfg. Company, Louisville, has been organized with a capital stock of \$20,000 by Harry Catlett, and others. A factory will be built and motor-driven metal working machinery will be installed.

Anders Rasmussen, florist, New Albany, Ind., will purchase a 175-hp. five-flue, horizontal boiler.

The city of Smith Mills, Ky., is in the market for a large engine and motor for the electric lighting plant. Address the mayor.

The Coeburn Lumber Company, Coeburn, Va., will erect two lumber mills on the timber tract of the Heuser Coal Company, Whitesburg, Ky.

The Tennessee Copper Company, 11 Broadway, New York City, is planning to install electrically operated equipment at the surface plants of two of its mines near Ducktown, Tenn., install new engines and air compressors, erect a green ore furnace, enlarge the sulphuric acid plant, and make numerous other changes.

Equipment for a large sawmill will be purchased by Lee McChesney, superintendent of the Douglas-Walkley Lumber Company, Bristol, Tenn.

The city of Pulaski, Tenn., will complete its lighting plant, a fund of \$20,000 now being available.

The city of Brownsville, Tenn., has voted \$12,000 of bonds for a waterworks.

St. Louis

ST. LOUIS, MO., March 9, 1914.

The machine tool market, after a short spurt, which promised well, slowed down to a condition about normal. Such business as has been coming has been limited in volume, and is for extension or replacement. The tendency to start new industries, especially in the environs of St. Louis, seems to depend on the decision as to the regional bank locations. Bankers are waiting for definite action so they may know what to depend upon in financing and also the direction in which they will have to look for regional reserve bank help later on. It is believed that the present hesitancy will end with this action. In general, existing industries are reported in good shape and running for the most part nearly up to capacity. Collections are reported fair. Second-hand machinery is dull.

The J. I. Case Company, St. Louis, has obtained a site and will equip it for the handling of its products, and will install some mechanical equipment.

The Mogul Truck Company, St. Louis, has been incorporated with a capital stock of \$10,000 by P. R. Walsh, and others. It will equip for repair and garage work as well as motor manufacture.

The Hilger-Siebold Mfg. Company, St. Louis, has been incorporated with a capital stock of \$19,000 by Michael Burghardt, and others, and will establish a woodworking factory.

The Pratt-Thompson Construction Company, Kansas City, Mo., has been incorporated with a capital stock of \$12,000 by John H. Thompson, and others, and will acquire equipment for general contracting.

The Tulsa Silo Company, Kansas City, Mo., has been incorporated with a capital stock of \$10,000 by J. F. Goodman, and others, to manufacture silos, etc.

The Hayti Light Company, Hayti, Mo., has been incorporated with a capital stock of \$10,000 by Edward

Bishop, and others, to equip and operate a public service electric plant.

The Richland Light & Power Company, Richland, Mo., has been incorporated with a capital stock of \$16,000 by W. I. Diffenderfer, J. B. Woodward and L. C. Harris, and will equip a public service plant.

The Hannibal Garage & Machine Company, Hannibal, Mo., has been incorporated with a capital stock of \$12,000 by Albert Bernauer, V. E. Jessup and A. L. Jones, to equip a repair shop and garage.

The Sealograph Company, Kansas City, Mo., has been organized with a capital stock of \$100,000 by D. G. Saunders, E. O. Haight, and others, and will, in conjunction with Saunders & Co., increase the equipment for manufacturing envelope sealers.

The city of Poplar Bluff, Mo., will receive bids until April 6 for a sewage disposal plant. E. C. Thomas is the engineer.

The city of Charleston, Mo., has determined upon an issue of \$83,500 in bonds for waterworks and sewage disposal plants.

By an order of the courts the Arkansas Water Company, Little Rock, Ark., will be compelled to install additional equipment involving an expenditure of about \$435,000. Edward Flad, St. Louis, will be in charge under the courts.

The Huntington Electric Light & Power Company, Huntington, Ark., has plans for the installation of additional equipment.

The Green Forest Electric Light & Power Company, Green Forest, Ark., has been incorporated with a capital stock of \$10,000, and will equip an electric plant. L. H. Smith is manager.

The Murphy-Raleigh Disinfecting Company, State Bank Building, Little Rock, Ark., is reported in the market for grinding and mixing machinery for the manufacture of sweeping compounds.

The board of trustees, Stigler, Okla., J. B. Sylinder, president, will receive bids until March 17 for work and equipment for a waterworks and sewage disposal equipment.

F. M. Harn, Texhoma, Okla., is reported in the market for a 125-hp. engine and boiler and a 100-kw. 60-cycle, 2300-volt generator and other equipment for an electric plant.

The city of Buffalo, Okla., has voted bonds for \$50,000 for a waterworks system and is in the market for equipment, etc. J. R. Chastain is clerk.

The Fremont Motor Company, Oklahoma City, Okla., has been incorporated with a capital stock of \$10,000 by B. Fremont, and others, and will equip a repair plant and garage.

The Childress, Mangum & Oklahoma City Railroad will erect and equip a roundhouse and railroad shops at Mangum, Okla. M. A. Weslow, Childress, Tex., is secretary.

The Missouri, Gulf & Oklahoma City Railway will equip a roundhouse and shop at Miami, Okla. J. W. Dawson, Muskogee, is engineer.

The Flexible Trolley Company, Tulsa, Okla., has been incorporated with a capital stock of \$13,000 by Jacob Gregory, and others, to manufacture a patented device.

The Patterson Nut Lock Company, Oklahoma City, Okla., has been incorporated with a capital stock of \$100,000 by B. G. Patterson, Oklahoma City; J. D. Oliger, Dallas, Tex.; J. C. Ward, Wichita Falls, Tex., and others, and will manufacture specialties.

The J. B. Wood Plow Works, Muskogee, Okla., has increased its capital stock for the purpose of increasing the capacity of its plant.

The Waynesboro Electrical Company, Waynesboro, Miss., has been incorporated with a capital stock of \$16,000 by C. C. and O. R. Green and J. A. Leggett, and will equip an electric light plant.

The Crystal Ice & Fuel Company, Gulfport, Miss., will install equipment to double the present output of its plant.

The city of Hammond, La., has voted \$18,000 of bonds to install a pumping station with fuel oil engines and improve its waterworks.

The New Orleans Biscuit Company, New Orleans, La., will erect and equip a factory to cost, complete with machinery, about \$200,000.

Texas

AUSTIN, TEXAS, March 7, 1914.

Planting is in progress all over the State and crop prospects are excellent. March has opened with a real increase in the demand for machinery and machine tools, and the market is expected to improve as the season advances.

H. Guenther & Sons, San Antonio, will increase the capacity of their Pioneer Flour Mills 600 bbl. daily, giving the plant a total capacity of 1800 bbl. An additional building costing about \$80,000 will be erected and more mill machinery will be installed.

Bids will be received by the City Council of Temple for the erection of an electrical pumping unit at the river station of the city waterworks plant, costing about \$8000. Two new pumping engines will be needed, which will give the station a capacity of 6,000,000 gal. per day.

The McAllen Ice, Light & Water Company, McAllen, has been organized with a capital stock of \$10,000 to erect an ice and light plant. The incorporators are F. E. Osborne, R. E. Horn and J. T. Cardwell.

The town of Pilot Point, Texas, has voted \$14,000 for a waterworks.

The Missouri, Kansas & Texas Lines will erect a large round house and division shops at San Antonio in connection with the new station and terminal system.

San Francisco

SAN FRANCISCO, CAL., March 3, 1914.

The month has brought some improvement in most machinery lines. Dealers are confident that active business will develop within the next 60 days. The demand for machine tools is still limited to small equipment, mainly for scattered points in the country; but these are coming out quite well for this time of year. The strong demand for implements and motor vehicles gives much promise. The larger railroads are still keeping out of the market, and nothing of importance has been heard from local lines. Large buyers are very slow to close, and considerable old business is pending. Heavy rains within the last fortnight caused great loss to railroads in southern California, and did a good deal of general damage, most of which, however, can be quickly repaired. Contractors are buying a little more freely, and find second-hand equipment plentiful. Many important construction plans are still held in abeyance.

Bids have just been received for the municipal car barn, to cost about \$150,000. The machine tool equipment has not been finally settled, owing to changes and extras that have come up since the bids were opened.

The Ocean Shore Railroad has about completed arrangements for the electrification of its line down the coast from San Francisco.

The Keystone Boiler Works, Main and Folsom streets, San Francisco, has been consolidated with the Main Street Iron Works.

The interest of the DuBois Estate in the Byron Jackson Iron Works has been transferred to John B. Keating, of Oakland, and others. Mr. Keating is manager. The transfer is said to involve over \$500,000.

The Keystone Iron Works, Los Angeles, has been incorporated with a capital stock of \$50,000 by A. D. Williams, George M. Young, A. J. Anderson and H. L. Griswold.

It is reported that the California Paint Company, San Francisco, will build a large factory at Bay Point, Cal.

The American Potash, Inc., Long Beach, Cal., announces that it will start work at once on the first unit of its kelp-reduction plant.

Equipment for the new plant of the Home Ice & Cold Storage Company, Long Beach, Cal., will include a compressor, engine, two boilers, pumping plant, etc.

The National Ice Cream Company, San Francisco, is preparing to build a new plant, for which consid-

erable special machinery, it is stated, will be required.

A. H. McClelland, chairman of town trustees, Montague, Cal., will receive bids until March 23, for the construction of a waterworks.

The Hydraulic Truck Company, Colton, Cal., has let contracts for a factory building.

It is reported that the International Computing Company, Pittsburgh, Pa., will equip a plant on High street, Oakland.

Lieut. George W. Danforth, chief of the department of machinery of the Panama-Pacific Exposition, has just returned from an Eastern trip in the interest of the exposition.

The San Pedro Foundry & Machine Company, San Pedro, Cal., has made preparations for the erection of a foundry and machine shop for which an expenditure of \$25,000 is contemplated.

The American Can Company is doing the preliminary work preparatory to the building of a plant at Ogden, Utah, the cost of which is estimated at \$250,000.

The Pacific Northwest

SEATTLE, WASH., March 3, 1914.

All the lumber camps will have re-opened by the middle of next month. The Clark-Nickerson Lumber Company, Canyon Lumber Company, Walton Lumber Company, Eclipse Mill, Weyerhaeuser Lumber Company, Ferr-Baker Lumber Company, and Robinson Mfg. Company, at Everett, Wash., employing more than 4000 men, re-opened their mills on March 4. From Vancouver, Wash., comes the announcement that the DuBois Lumber Company, one of the largest in the Northwest, has re-opened its mill with a full crew; and others will be running within the week. Several large orders have been received; one for 5,000,000 ft. of ties, to be shipped to India for railroad construction.

An appropriation of \$1,380,000 has been authorized by the Interior Department for the Yakima irrigation project in the eastern part of this State. This amount includes \$190,000 for pumping plant machinery. A sum of \$240,000 is set aside for extension of the Sunnyside project unit. C. H. Swigart, of the Interior Department, now located at North Yakima, is supervising engineer.

The National Tire & Rubber Mfg. Company, Seattle, Wash., has been incorporated with a capital stock of \$1,000,000 by F. P. Marine and others. It is reported that a large factory is to be built.

The Washington Oregon Glass Company, Seattle, Wash., has been incorporated with a capital stock of \$50,000 by F. G. Conway and others.

A building permit has been issued to N. L. Upper, 1601 Joliet avenue, Seattle, Wash., for a shingle mill.

The South Pacific Lumber & Box Company, Seattle, Wash., has been incorporated with a capital stock of \$50,000. H. J. Bailey and J. Ragot, Seattle, are the incorporators.

The Lindenberger Packing Company, Seattle, will expend approximately \$150,000 in improvements to its Roe Point salmon cannery, Ketchikan, Alaska. These include the installation of new sanitary machinery, the construction of shops, etc.

The West Coast Wire Company, Seattle, Wash., has changed its name to the Kent Wire Company.

The Southwest Mfg. Company, Raymond, Wash., is rebuilding its shingle mill which was burned last fall.

It is reported that the factory of the Pacific Wagon & Carriage Works, Seattle, Wash., recently destroyed by fire, with a loss of over \$11,000, will be rebuilt.

The Chehalis Produce Company, Chehalis, Wash., announces that it will erect a mill at Palouse, Wash.

H. W. Stuchell, of the Eclipse Mill, Everett, Wash., announces that he will build a shingle mill in Vancouver, B. C., with a daily capacity of 1,500,000 shingles.

The Silver City Mining & Milling Company, Silver City, Idaho, will remodel the Blaine Mill and make

improvements, including the installation of modern machinery. C. L. Cook, Silver City, Idaho, is the engineer.

The Peoples Water Company, Zillah, Wash., has been incorporated with a capital stock of \$15,000, by Walter Granger and others. It is stated the company plans to construct a water system.

The city of Lewistown, Mont., is preparing to issue \$60,000 of bonds for the extension and improvement of the water system.

Eastern Canada

TORONTO, ONT., March 7, 1914.

By order of the minister of railways and canals, the Lachine canal has been emptied, and 40 factories along its course will have to close down because of lack of water power. In some cases auxiliary steam plants are in operation, but these are insufficient to meet the demand. In January the department announced that it intended to drain the canal to enable it to erect a large power plant near Cote St. Paul, Que. The work will be started at once.

Classic Furniture, Ltd., Stratford, Ont., has been incorporated with a capital stock of \$200,000 by George McLagan, David M. Wright, Julian D. Davies, and others, to manufacture furniture, etc.

The Canada Pole & Shaft Company, Ltd., St. Catharines, Ont., has been incorporated with a capital stock of \$400,000 by James K. Kernahan, John S. Campbell, Vernon Moyer, and others, to manufacture vehicle poles and shafts.

The London & Petrolia Barrel Company, Ltd., London, Ont., has been incorporated with a capital stock of \$500,000 by John P. Forristal, George Gibbons, George S. Gibbons, and others, to manufacture and deal in boxes and other containers.

The Wearwell Paint & Varnish Company, Ltd., St. Lambert, Que., has been incorporated with a capital stock of \$25,000 by George R. Lord and Henry Plow, of St. Lambert, Que., and others, of Montreal, to manufacture paint, lead, varnish, etc.

L'Aqueduc de St. Cuthbert, Ltd., St. Cuthbert, Que., has been incorporated with a capital stock of \$40,000 by Joseph A. Guilmette, Melvin Jacques, and others, of Montreal, to manufacture iron, cement, etc.

The Shea Sales Company, Ltd., Montreal, has been incorporated with a capital stock of \$50,000 by John J. Creelman, Gilbert S. Stairs, and others, to manufacture machinery, signs, tools, etc.

The Royal Metal Separator Company, Ltd., Kenora, Ont., has been incorporated with a capital stock of \$100,000 by Otto K. Quast, Harold A. C. Machin, James A. Kinney, and others, to manufacture machinery, etc.

The Bathurst Lumber Company, Bathurst, N. B., announces that it has completed plans for the erection of a 50-ton sulphite pulp mill at Bathurst. Work is to be started at once. It is to be ready for operation by May 1, 1915, and will be operated under the name of Bathurst Pulp & Paper Company, Ltd., with a capital stock of \$3,000,000. Angus McLean, Bathurst, will be president and A. G. McIntyre, manager.

The Cedars Construction Company, Ltd., Montreal, has been incorporated with a capital stock of \$50,000 by Herbert W. Jackson, George R. Drennan, and others, to generate power and electric current.

The Canadian Peat Company, Ltd., Toronto, has been incorporated with a capital stock of \$250,000 by Hugh P. Bell, John W. Sutherland, M. Chapman, and others, to manufacture peat fuel and clay products.

The United Motors, Ltd., Toronto, has been incorporated with a capital stock of \$50,000 by James J. Kenney, Lloyd C. Loomis, William L. Rowley, and others, to manufacture automobiles, motor trucks, etc.

The Sterling Supply Company, Ltd., Ottawa, Ont., has been incorporated with a capital stock of \$40,000 by Edwin F. Holcomb, Joseph H. Barker, and others, of Ottawa, Ont., to manufacture and deal in book machinery, etc.

The Huntsville Woolen Mills Company, Ltd., Huntsville, Ont., has been incorporated with a capital stock

of \$40,000 by John Dobney, Joseph J. Hubbard, James A. Tweed, and others.

The Capital Brewing Company, Ltd., Ottawa, Ont., has been incorporated with a capital stock of \$100,000 by Henry Kuntz, James Naismith, and others.

The Hamilton Sand & Gravel, Ltd., Hamilton, Ont., has been incorporated with a capital stock of \$80,000 by William D. Flatt, William Kerr, Harry H. Davis, and others, to manufacture brick, tile, cement, etc.

The Eagle & Globe Steel Company, Ltd., has been granted a charter in Ontario to manufacture steel, iron, tools, machines, etc. It has a capital stock of \$40,000. Robert V. Clarbrough, Toronto, has been appointed attorney.

Orme, Ltd., Ottawa, Ont., has been incorporated with a capital stock of \$200,000, by Frank L. Orme, Martin Orme, Owain Martin, and others, to manufacture pianos, etc.

Western Canada

WINNIPEG, MAN., March 6, 1914.

General business and industrial conditions show more improvement. The outlook is much better. Machinery houses are now receiving more and larger orders. Trade is not active, however. The financial situation is certainly easier. Money for investment purposes is more plentiful, and has a cheaper tendency on account of the lower rates in the East. Recently some of the larger flour mills have been buyers of moderate amounts of machinery for repairs.

The Home Grain Company, Ltd., Winnipeg, Man., has been incorporated with a capital stock of \$250,000 by Hugh Phillips, and others, of Winnipeg, to manufacture flour, etc.

R. J. Boyd, Stetler, Alta., has completed arrangements for the erection of a flour mill.

The McClellan Stooker Company, Ltd., Winnipeg, Man., has been incorporated with a capital stock of \$100,000 by George McClellan, and others, to manufacture machines to stook grain, etc.

Sealed tenders addressed to the chairman, board of control, will be received at the office of M. Peterson, Winnipeg, Man., up to March 23, for the supply and delivery at Lac du Bonnet Station, Man., of one steam locomotive, complete with tender and snow plow. Information regarding the tender may be obtained at the city light and power department, 54 King street, Winnipeg.

The Standard Unrefillable Bottle Company, Ltd., Winnipeg, Man., has been incorporated with a capital stock of \$40,000 by John C. Samson, and others, to manufacture corking devices to prevent refilling of bottles, etc.

The National Talking Machine Company, Ltd., Winnipeg, Man., has been incorporated with a capital stock of \$50,000 by Aylmer E. Dilts, and others.

H. H. Pinch, Transcona, Man., will receive bids until March 10 for a sawdust exhaust system for the car shop of the National Transcontinental Railway.

The Keystone Cement Company, Blairmore, Alta., will start work on its factory as soon as possible.

The Western Canada Milling Company, Calgary, Alta., is enlarging the capacity of its plant to 1200 bbl. per day. The additions will cost about \$100,000.

The City Council, Medicine Hat, Alta., is spending \$65,000 on machinery and equipment for a municipal power station.

G. H. Archibald, of George H. Archibald & Company, Ltd., engineers and contractors, Winnipeg, is forming a company to establish a plant at Carman, Man., for the manufacture of sewer pipe, tile, etc.

The Leitch Brothers Milling Company, Ltd., Oak Lake, Man., has arranged with the City Council, Regina, Sask., to erect there a 3000-bbl. flour mill, a 200-bbl. oatmeal plant and grain elevators.

The City Council, Edmonton, Alta., has approved the expenditure of \$558,260 for the completion and extension of the power plant, \$174,214 for extensions to the electric light system and \$156,173 for the local telephone system.

Warren Overpack, Medicine Hat, Alta., has purchased the Purmal Brick Company and will greatly enlarge its plant and install additional machinery.

R. B. Bennett announces that the Government will erect one of the largest elevators in the West, on a 36-acre site at Calgary, Alta. Tenders will be called in May.

The Interior Grain Elevator Company, Saskatoon, Sask., will erect several elevators in the vicinity of Saskatoon.

The Smith Davidson Flour Mills & Elevator Company, Fort Coquitlam, B. C., will commence operations on the erection of a large flour mill and elevator.

The Soo Line Milling Company, Weyburn, Sask., will make extensions to its mill.

The Electric Light & Power Company, Ltd., Lumsden, Sask., was partially destroyed by an explosion. One of the large engines was ruined. Earnest Brown is president.

The factory of the Milne Produce Company, Vancouver, B. C., was damaged by fire with a loss of about \$10,000. The principal damage was to the machinery, much of which will have to be replaced.

Book Reviews

Fowler's Mechanics' and Machinists' Pocket Book and Diary. Pages 476, 4 x 6 in. Published by the Scientific Publishing Company, Manchester, England. Price, 6d. (12 cents) net.

Sixth annual edition, containing a synopsis of practical rules for millwrights, erectors, pattern-makers, foundrymen, draftsmen, students and others. It is an excellent book for those who desire a work on shop practice.

Fowler's Mechanical Engineers' Pocket Book. Sixteenth Annual Edition. Pages 576, 4 x 6 in. Published by the Scientific Publishing Company, Manchester, England. Price, cloth, 1s. 6d. (35½ cents) net; leather and gilt edges, 2s. 6d. (61 cents) net.

Contains miscellaneous tables and formulæ for mechanical engineers. Touches on steam boilers, fittings, engines, fuels, internal combustion engines, hydraulics, hoisting apparatus, iron and steel springs, ventilation and heating, etc.

The Mechanical World Pocket Diary and Year Book. Pages 443, 4 x 6 in. Illustrated. Published by Emmott & Co., Ltd., Manchester, England. Agent in the United States, Norman-Remington Company, Baltimore, Md. Price, 25 cents.

This handbook, which is in its twenty-seventh year, contains information of value to engineers, machine designers and machinists. Included are new data on steam turbines, milling, gear cutting, grinding, etc.

The Mechanical World Electrical Pocket Book. Pages 311, 4 x 6 in. Illustrated. Published by Emmott & Co., Ltd., Manchester, England. Agent in the United States, Norman-Remington Company, Baltimore, Md. Price, 25 cents. Revised edition of a collection of electrical engineering notes, rules, tables and data; contains several features not found in previous editions.

Directory of Boiler Makers

The Supplymen's Association of the American Boiler Manufacturers' Association announces the completion of its list of boiler, tank and stack manufacturers of the United States and Canada. It is compiled in neat booklet form and contains names and addresses of something over 900 manufacturers. These books are offered to interested parties, such as tool and material manufacturers, at \$3 per copy, by the secretary, F. B. Slocum, Continental Iron Works, West and Calyer streets, Brooklyn, N. Y.

Government Purchases

WASHINGTON, D. C., March 9, 1914.

Bids will be received by the Bureau of Supplies and Accounts, Navy Department, Washington, until March 31, schedule 6495, for one motor-driven radial drill, two turret lathes and one boring and turning lathe, all for Washington; schedule 6497, for one portable milling machine for Norfolk; until April 7, schedule 6521, for one forced draft blower, for Mare Island; schedule 6522, for two cargo oil pumps, for Mare Island.

Bids will be received by the U. S. Engineers Office, Pittsburgh, Pa., until April 1, for derricks and engines.

Bids were received by the Bureau of Supplies and Accounts, Navy Department, Washington, on March 3, for furnishing the following materials and supplies for the navy yards:

Schedule 6371, Steam Engineering

Class 87, Quincy—Two generator sets and spare parts—Bid 58, informal; 88, \$1128.70.

Schedule 6382, Construction and Repair

Class 125, Brooklyn—Two motor-driven saw tables—Bid 4, \$416.70; 217, \$476 and \$440; 230, \$247.50 and \$439; 235, \$323.30; 244, \$375, \$445 and \$301; 246, \$431.60; 247, \$452, alternate \$464.50.

Class 126, Brooklyn—Two motor-driven wood lathes—Bid 4, \$684.25; 244, \$448; 246, \$711.30; 247, \$450.

Schedule 6383, Steam Engineering

Class 131, Norfolk—18 independent lathe chucks—Bid 13, \$655.20; 65, \$738; 81, \$719.70; 149, \$697.20; 217, \$660 and \$384; 202, \$692.16; 230, \$420 and \$713.40; 237, \$664.50; 238, \$647.76; 244, \$697.20; 245, \$673.50; 246, \$666.78.

Schedule 6390, Construction and Repair

Class 173, Brooklyn—15 portable electric drills—Bid 29, \$43; 39, \$40; 41, \$41.40; 86, \$43.75; 113, \$64.50; 167, \$42; 168, \$65; 185, \$45; 227, \$57; 230, \$55.39; 260, \$53.90.

Bids were received by the general purchasing agent of the Isthmian Canal Commission, Washington, February 27, under canal circular 828, for the following materials:

Class 4—80 vanadium-steel driving springs for class 651 locomotives—Bid 10, \$1151.60, 45 days; 20, \$1247, 40 days; 22, \$997.40, 50 days; 28, \$999.80, 60 days; 31, \$1302.60, 45 days.

Class 5—100 car-journal bearings—Bid 1, \$328.80, 30 days; 11, \$318, 60 days; 14, \$440, 40 days; 33, \$800, 60 days.

The names of bidders and the number under which they are designated in the above lists are as follows:

1. Ajax Metal Company
4. American Woodworking Machinery Company
10. Crucible Steel Company
11. Damascus Bronze Company
13. L. A. Benson
14. Hakemeyer Machine Company
20. Pittsburgh Steel Spring Company
22. Railway Steel Spring Company
28. Standard Steel Works Company
29. Chicago Pneumatic Tool Company
31. Union Spring & Mfg. Company
33. West St. Louis Machine & Tool Company
39. James Clark, Jr., Company
41. Cincinnati Electrical Tool Company
58. Electric Specialty Company
65. Fairbanks Company
81. Hamilton-Buck Mfg. Company
86. Hisey, Wolf Machine Company
88. Holtzer-Cabot Electric Company
113. A. H. McCay
149. S. M. Price Machinery Company
167. Standard Electric Tool Company
168. Stow Mfg. Company
185. United States Electrical Tool Company
202. William E. Williams
217. Frevert Machinery Company
227. Western Electric Company
230. F. A. Branda & Company
235. Fairbanks Company, New York
237. R. W. Geldart
238. Knickerbocker Supply Company
244. Manning, Maxwell & Moore
245. Montgomery & Co.
246. Manhattan Supply Company
247. Oliver Machinery Company
260. Fortuna Machine Company

The Belvidere Screw & Machine Company, Belvidere, Ill., at its annual meeting in February re-elected its officers and declared the regular semi-annual dividend of 3 per cent., payable April 1. The company reports the past year a very prosperous one. F. S. Whitman is president and treasurer; George M. Marshall, vice-president; W. S. Brown, secretary and general manager.

The Van Dorn Electric Tool Company, Cleveland, Ohio, has opened a sales office at 1013 Mutual Life Building, New York, with A. J. Borget as district sales manager. His territory will cover the New York district east of Rochester.

S. DIESCHER & SONS,
Mechanical and Civil Engineers,
PITTSBURGH, PA.

Trade Publications

Steel and Machinery.—Minneapolis Steel & Machinery Company, Twenty-ninth and Minnehaha streets, Minneapolis, Minn. Pamphlet. Contains an illustrated outline of what this company does in the manufacturing of structural steel, steel bridges, sheet metal products; steam, gas and oil engines; gas producers, hoists, derricks, power transmission machinery, grain elevator fittings, machine castings, etc. Illustrations are given of the various lines with brief descriptions, in some cases the engravings being views of actual contracts.

Contractors' Equipment.—Whitman Agricultural Company, St. Louis, Mo. Catalogue No. 70. Deals with a line of contractors' equipment which includes gasoline engines in a number of different sizes and styles, hoisting engines, pumps, air compressors, elevators, etc. The various pieces of equipment are all illustrated and described and a comprehensive specification table for the engines is included.

Concrete Reinforcing Fabric.—Clinton Wire Cloth Company, Clinton, Mass. Pamphlet. Pertains to a line of electrically welded wire which is used as a reinforcement for concrete floor slabs. The structural features of the fabric are first taken up and this is followed by a discussion of reinforced concrete floor slabs with reference to the placing of the reinforcement in the several types.

Reinforced Concrete Construction.—C. A. P. Turner, Walker-Burton Building, Minneapolis, Minn. Bulletin No. 13. Is an exposition of the mushroom system of reinforced concrete construction for factory buildings and industrial plants. A general discussion of reinforced concrete construction is given with brief mention of the decreased fire hazard and the safety of the construction. A description of the mushroom system, which takes its name from the peculiar formation of the rods around the column head, follows, together with the results of a number of tests that have been made. Over half of the 47 pages of the bulletin are given over to illustrations of the various kinds of buildings that have been constructed by this system.

Grinding Machines.—Charles H. Besly & Co., Chicago, Ill. Pamphlet. Contains a number of illustrations of various operations that can be performed on grinding machines. These include the finishing of castings for gas engines and automobile tire pumps, gears, iron castings for door latches, wooden handles, thin circular steel blocks, etc. In connection with the engravings, brief descriptions of the operations are given and the amount of time required for doing the work.

Rotary Converter.—Wagner Electric Mfg. Company, St. Louis, Mo. Miniature bulletin No. 103. Describes a single-phase converter for changing alternating current to direct current and also serving as a power motor when desired. The construction of the apparatus is briefly touched upon and a number of its applications are gone into at some length, the text being supplemented by engravings.

Engines.—McIntosh & Seymour Corporation, Auburn, N. Y. Bulletins Nos. 51 and 52. The former describes in a general way the Diesel oil engine situation and the different types built by this firm. This includes data on the economy of this type of prime mover, a comparison of its working cycles with those of the steam and gas or gasoline engine and one of the four and two cycle types of internal combustion engine. Bulletin No. 52 describes and illustrates the type F steam engine which is built in the single cylinder, tandem compound and cross compound styles. Views of the various parts of the engine are employed to supplement the text description and a table of the sizes and speed which can be supplied is included.

Shop Furniture.—Manufacturing Equipment & Engineering Company, Boston, Mass. Circular and folder. The former describes a bubbling fountain for shop, factory, office and general use which can be furnished either with or without an ice tank for cooling the water and a line of wash bowls in batteries. The folder pertains to a line of metal sanitary and fireproof equipment, including stock and storage racks, metal lockers, all steel stools and chairs, metal shelving and vault fixtures, soda kettles, water heaters, work benches and kindred equipment. There is practically no text in the folder, the story being told by illustrations of the various lines.

Lathes.—R. K. LeBlond Machine Tool Company, Cincinnati, Ohio. Catalogue. Size, 6 x 9 in.; pages, 135. Illustrates and describes a line of lathes which includes regular stud, standard and quick change engine, automobile, rapid production, gap, chucking, turret and motor-driven engine types. The general description of the lathes is given covering 24 pages and supplemented by numerous engravings of different parts. Following this, the catalogue is given over to illustrations of the different types that can be supplied, with descriptions and tables of specifications. The various attach-

ments that can be furnished with the lathes are illustrated and briefly described, and mention is also made of some of the company's other products, such as plain and universal milling machines, cutter and tool grinding machines and an automatic rack cutting machine. Directions for erecting the lathes and a complete telegraph code are included.

Drilling and Boring Machine.—Pawling & Harnischfeger Company, Milwaukee, Wis. Pamphlet entitled "Difficult Drilling and Boring Made Easy." Describes a horizontal boring and drilling machine which is made in several types with particular reference to the various classes of work for which it is adapted. Supplementing the description is some 20 pages of specific examples taken from actual shop operations where unusual drilling and boring work has been handled with these machines.

Graphic Electric Meters.—Esterline Company, Indianapolis, Ind. Folder No. 312. Deals with a graphic electric meter which can be supplied in both portable and stationary types for mounting on a switchboard or wall. The use of this meter is gone into at some length and there is a brief description of its construction.

Electric Traveling Cranes.—Niles-Bement-Pond Company, 111 Broadway, New York City. Catalogue. Size, 9 x 12 in.; pages, 90. Gives a general idea of a number of different types of electric cranes, trolleys and hoists and the principal details of the company's standard electric crane. About half of the catalogue is given over to full page views of installations, giving a brief description of the size and capacity of the crane, where it is installed and what it is used for.

Coal and Rock Drills.—Leetonia Tool Company, Leetonia, Ohio. Catalogue No. 2. Illustrates and describes a line of tools for use in and around coal and clay mines. These include a number of different types of drills, copper tools of all sorts for use where copper tools are required by the law, hammers, picks, chisels, hatchets and several types of bars.

Flat Turret Lathe.—Modern Machine Tool Company, 4657 Spring Grove avenue, Cincinnati, Ohio. Circular. Calls attention to a 2¼ x 26 in. cross slide flat turret lathe, which was illustrated in *The Iron Age*, November 27, 1913. The cross slide has 10 stops which stop the slide in either direction and can be used for one tool or in any combination for a series of tools. The various features of the lathe are briefly touched upon and an illustration and a condensed table of specifications are included.

Grinding Pan.—Clearfield Machine Shop, Clearfield, Pa. Bulletin No. A-19. Deals with a 7-ft. standard wet or dry grinding pan, which has been recently developed. An illustration of the pan, which is belt driven from an electric motor is given, together with condensed specifications. This pan is designed for use under conditions where a large output is not required or where sufficient power is not available for a heavier pan. The change from the dry to the wet pan is easily made by the substitution of screen plates for solid outside ones.

Metal Working Machinery.—Garvin Machine Company, Spring and Varick streets, New York City. Circular No. 205. Treats of an extensive line of metal working machinery, which includes plain, universal, hand, cam, duplex, vertical-spindle and profile milling; die and screw slotting, grinding, horizontal drilling, automatic tapping and screw machines, lathes, etc. All of these are illustrated, a single page being given to each machine, with a brief statement of the special features underneath.

Ratchet.—Billings & Spencer Company, Hartford, Conn. Leaflet. Devoted to a double-acting ratchet in which sockets can be easily and quickly changed without using a wrench or other tool. The equipment of the tool, which is illustrated, includes two removable sockets for taper and square shank drills.

Water Tube Boiler.—Egbert R. Morrison, Sharon, Pa. Circular No. 1. Points out the various features making for safety, economy and efficiency in the Morrison water tube boiler, which was illustrated in *The Iron Age*, November 27, 1913. The special feature about this boiler is that the tubes are so arranged that any one can be removed without injury to any other or without displacing the baffles or the brickwork. A number of drawings showing the front elevation and side and end sections of the boiler are included.

Safety Device for Power Presses and Drop Hammers.—H. C. Hart, Unionville, Conn. Circular. Refers to a safety device for use on power presses and drop hammers in which the hand operating the machine is pulled out of the way when the machine is working. The desired result is secured by connecting a glove, in which the operator's hand is inserted, through a chain and a combination of levers, shafts and cams to the slide of the press. A brief description of the device is given, together with an engraving showing how it is installed.



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